AUGUST, 1955

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and PLANT FOOD INDUSTRY

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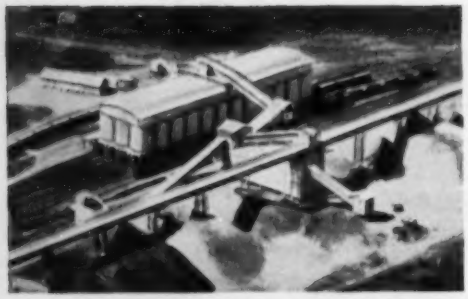

From the air—wet rock storage and drying plant, with dry rock storage silos in background. These silos, 29 in number, have a total capacity of 40,000 tons of dried rock. Under the silos are four runways where 40 railroad cars can be loaded at a time.

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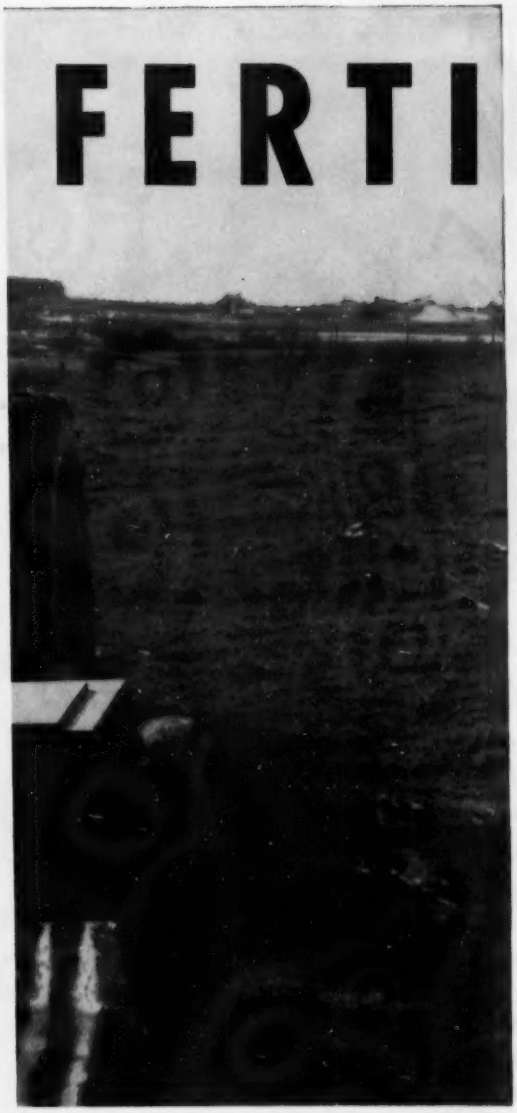

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President
ERNEST H. ABERNETHY

Editor
BRUCE MORAN

Managing Editor
CLAY W. PENICK, JR.

Business Manager
V. T. CRENSHAW

Chicago Representative
ELON A. ABERNETHY
1200 N. Ashland Ave.—Room 544
Phone CApitol 7-4111

West Coast Representative
M. A. CALDWELL
2267 W. 24th St., Los Angeles, Cal.
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and PLANT FOOD INDUSTRY

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Commenting Freely

by BRUCE MORAN

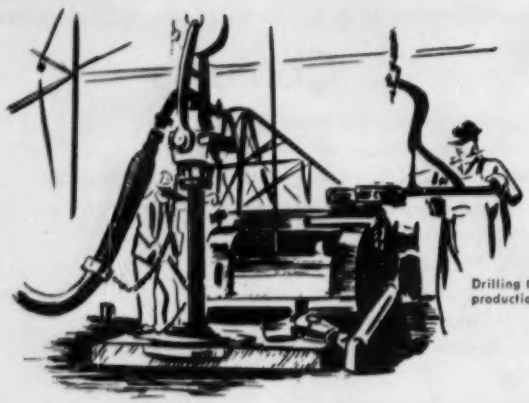
I like very much a thought expressed recently by J. Ritchie Smith speaking at a Cotton Council district meeting. Perhaps I like it because it says so very well what we have been trying to say in Commercial Fertilizer magazine for so many years.

Anyhow, Mr. Smith's point is: "In looking back to the beginning of public farm research and education, we find little justification for the narrow concept of insurance against scarcity. Rather we find the idea for a system of helping farmers help themselves . . ."

That is, of course, the basic thinking of the Land Grant Colleges, and all the fine work that stems from these centers. It is the basic thinking of more fertilizer makers that was the case when we first began to sing this song. It is the basic thinking of a steadily increasing number of big suppliers of chemicals for agriculture.

Perhaps that is why they are big. Perhaps it is because they are big. At any rate, it is smart thinking, smart operation, and something that could profitably spread downward to the smaller operators—who can do it even better because they are closer to the individual farmer.

As Mr. Smith says, "The chief product would be a better and more rewarding life for farm people." It would also sell a lot more fertilizer.



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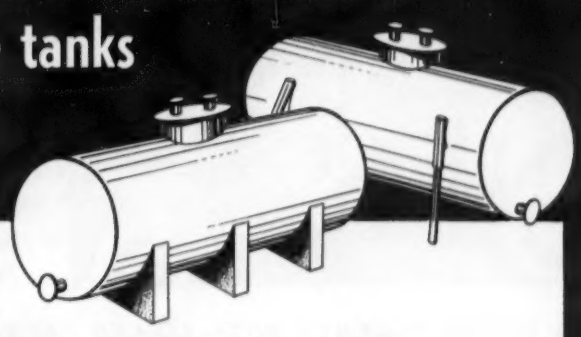

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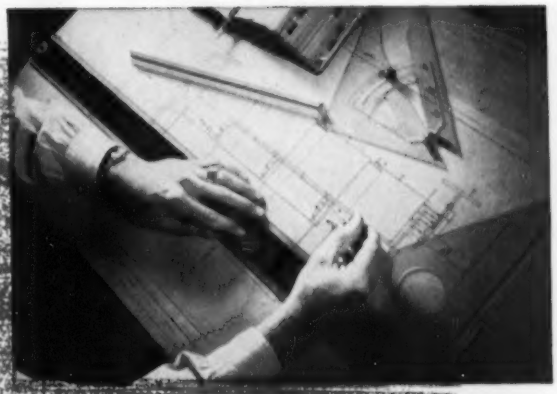
from the drawing board to complete plant

for complete dry mixing or superphosphate plants



Extensive research and planning are necessary to assure maximum efficiency of a fertilizer plant. Each plant must be individually planned and constructed to meet the specific requirements of the location. Expert supervision must be given to the installation of equipment and construction of the building to realize full operating efficiency. From the original plan to the operating plant, a competent staff, with broad, practical experience, guide your plant through the design, engineering, manufacturing, fabrication and construction phases. Any or all of these services are available to you at one source with Davidson-Kennedy Company. In addition, they stand ready upon completion to train any personnel in plant operation. Davidson-Kennedy Company, manufacturers of a complete line of fertilizer machinery, offer you an engineering service second to none in the industry.

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Two processes to make

GRANULAR CONCENTRATED FERTILIZER *From* CALCIUM METAPHOSPHATE

Presented by
JAMES E. SEYMOUR
Illinois Farm Supply Company
at 1955 Research Conference
American Farm Research Association
St. Paul Minnesota
July 15, 1955

INTRODUCTION

The nation's major phosphate resources are located in the West. Midwest agriculture will, in the future, have to look largely to these western deposits for its source of phosphate. The nature of the western deposits and their location near potential hydro-electric power make the electric furnace process the most efficient means of extracting phosphorus. The elemental phosphorus can then be converted into a myriad of compounds. The fertilizer industry is a consumer of phosphoric acid which can be produced from elemental phosphorus.

A process for the commercial production of a highly concentrated phosphatic fertilizer material from elemental phosphorus and phosphate rock has been developed by the Tennessee Valley Authority. This product is known as calcium metaphosphate. It is a white vitreous, ammonium citrate soluble, water insoluble compound. Its P_2O_5 analysis ranges from 60 to 65%. This high concentration, together with the non-hazardous nature of the material make the economics of shipping it long distances very favorable. The product has been proven suitable for a phosphatic fertilizer on acid soils. On basic or neutral soils, it is less efficient. As a phosphatic fertilizer material, much of the TVA produced calcium metaphosphate is being used for the dry blend manufacture of high analysis mixed fertilizers or for direct soil application.

The production of calcium metaphosphate from western deposits is under study by several of the phosphorus producers. Among the organizations considering expansion in this direction is Central Farmers Fertilizer Company, who is engaged in the development of plans to produce elemental phosphorus and convert it to calcium metaphosphate from the phosphate rock contained in their property near Georgetown, Idaho. This western produced calcium metaphosphate is an ideal raw material for the production of high analysis granular mixed fertilizer and semi granular enriched superphosphates, by the use of the "Seymour Process" developed by Illinois Farm Supply Company. This process makes it possible to convert the calcium metaphosphate to various grades of mixed fertilizers and enriched superphosphates.

The "Seymour Process" consists of a number of processes or methods of converting metaphosphates into high analysis fertilizers. Some of these processes produce completely water soluble fertilizers. Most of the process products are granular or semi-granular. It is possible to produce any common "P", "P-K", "N-P" or "N-P-K" ratio fertilizer by the proper selection and utilization of one of these processes.

This disclosure will be confined to a generalized description of just two of the several processes.

All of the embodiments of the "Seymour Process" are based upon the hydrolysis of metaphosphate. This hydrolysis reaction is not a recent discovery. However, prior work on metaphosphate hydrolysis has not indicated that this reaction would be adaptable to commercial fertilizer practices. Extensive laboratory and pilot plant work over the last several years by Illinois Farm Supply Company has resulted in discovery of a number of ways by which metaphosphate hydrolysis can be employed under conditions readily obtained in the fertilizer industry.

PROCESS A-1 ENRICHED SUPERPHOSPHATES

One of the primary objectives of fertilizer industry research is the production of higher analysis fertilizers at a reduced cost to the consumer. This can be partially achieved by being enabled to produce high analysis phosphatic products (capable of chemically absorbing ammonia) at a lower cost per unit of plant food than the conventionally produced enriched superphosphates, triple superphosphate or combinations of normal and triple superphosphates, now being used to manufacture the more concentrated mixed fertilizers.

The enriched superphosphates of this process are produced by reacting various combinations of calcium metaphosphate, rock phosphate dust, sulfuric acid and water with subsequent mechanical or physical processing. The product should be conventionally "bin" or "pile" cured to promote substantial conversion of the rock phosphate.

We have experimentally manufactured these enriched superphosphates in conventional superphosphate equipment. The product grade range indicates extreme operational flexibility.

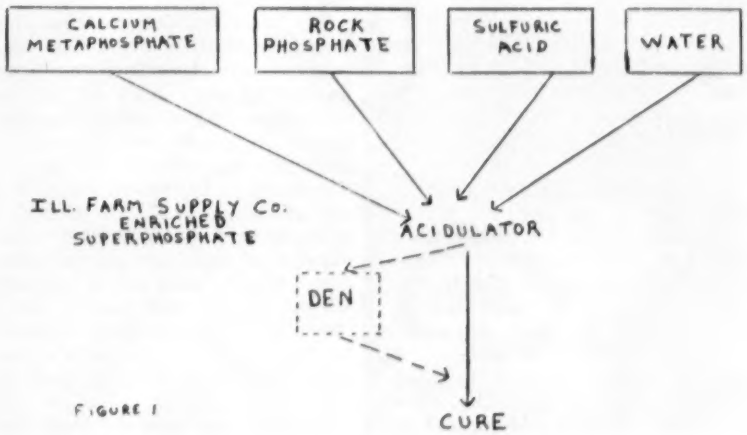


FIGURE 1

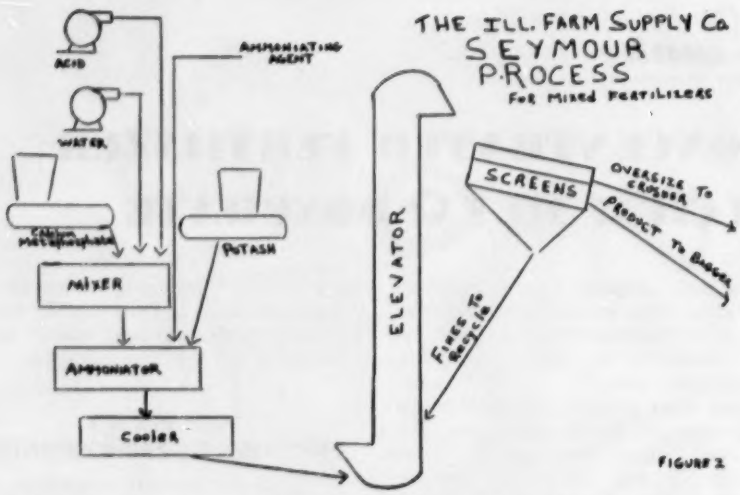


FIGURE 2

Although enriched phosphatic products ranging from an 0-21-0 grade to grades in excess of 0-50-0 have been prepared in the laboratory, our production efforts in conventional process equipment have been confined to the median portion of the range. We manufactured those grades that could easily be used in the manufacture of specific grades of mixed fertilizers. These enriched supers reflect a savings of approximately 14¢ per unit of P_2O_5.

One formulation for an 0-30-0 is as follows:

	% by Weight
Calcium metaphosphate (64%)	23.39%
Rock phosphate (75% B.P.L.)	42.08%
H_2SO_4 (58° B.E.)	34.51%
Surfactant (Sterox AJ)	.02%
	100.00%

The rock phosphate dust, sulfuric acid, calcium metaphosphate, and water are intimately mixed in the acidulator. Primary chemical reactions occurring in the acidulator are: hydrolysis of the calcium metaphosphate, the subsequent acidulation of the calcium metaphosphate hydrolysis product, and the conventional acidulation of rock phosphate. The hydrolysis of the calcium metaphosphate is promoted by the presence of sulfuric acid and water, the heat of solution of the sulfuric acid, and heat of reaction of the acid and rock phosphate.

It is interesting to note that the sulfuric acid is not "used up" by the hydrolysis reaction but rather, with respect to that reaction, acts only to promote hydrolysis. The hydrolysis reaction runs concurrently with acidulation of the rock phosphate. With proper formulation and process conditions, hydrolysis is initiated quickly and proceeds rapidly, even though the sulfuric acid content of the reaction mixture soon begins to decrease as the rock phosphate is acidulated. Of course, the product of hydrolysis is monocalcium orthophosphate. This hydrolysis product will react with the sulfuric acid to produce two moles of phosphoric acid for each mole of sulfuric acid used up.

PROCESS B-1 MIXED FERTILIZERS

The complexity of present manufacturing techniques and processes, the necessity of "pile" or "bin" curing the manufactured products for prolonged periods, and the demand for a free flowing granular product represent a significant portion of the consumer fertilizer cost. A reduction in the cost or elimination of any of the above can result in savings to the consumer.

The "Seymour Process" mixed fertilizers are produced by reacting various combinations of calcium metaphosphate, sulfuric acid, and water with subsequent ammoniation, potash addition and incorporation, drying, cooling, classifying, and packaging. "Pile" or "bin" cure is not required for the manufacture of free flowing granular products by this process.

The lower fertilizer costs possible through utilization of the "Seymour Process" are not confined to savings accrued by elimination of the bin cure stage and by other improvements in process techniques and methods. Appreciable savings are also found in ingredient costs. The per unit savings will vary according to grade or formula variation. One example of ingredient cost reduction in an Illinois plant shows approximately 9¢ per unit savings in a "Seymour Process" high analysis 1-1-1 ratio when compared to a conventionally produced high analysis 1-1-1 ratio.

We have mentioned the feasibility of producing any common "P", "P-K," "N-P," or "N-P-K" ratio fertilizer by the proper selection of one of these processes. Extreme flexibility is possible through variations in formulations and ingredients. Example of high analysis common ratios which have been experimentally produced in our pilot plant are 14-14-14, 6-24-24 and 10-20-20.

One 14-14-14 formula uses the following pounds of ingredients to manufacture one ton of product:

Calcium metaphosphate (64%)	441.6 lb.
Sulfuric Acid (60°B.E.)	510.8 lb.
N Solution B (40.8%)	693.2 lb.
Potash (62%)	456.2 lb.
Water	60.0 lb.

Calcium metaphosphate, sulfuric acid, and water are proportioned in various combinations into a mixer. The heat of solution of the sulfuric acid and the presence of this strong mineral acid promotes hydrolysis of the calcium metaphosphate. Subsequent sulfuric acid reaction with the calcium metaphosphate hydrolysis product yields two moles of phosphoric acid for each mole of sulfuric acid used. The hydrolysis-acidulation reaction mixture is transferred to an ammoniator and reacted with an ammoniating agent. A potassic ingredient may be added to the reaction mixture in the ammoniator if desired. Both granulation of the product and partial drying of the product occur in the ammoniation phase of the process. Subsequent processing involves conventional cooling, transfer, classification and packaging.

The process offers the following advantages:

1. Produces a dry, granular, free flowing, high analysis, homogeneous product.
2. "Pile" or "bin" curing period is eliminated.
3. Utilization of less expensive ingredients.
4. High water soluble P_2O_5 values.
5. Utilization of the heat of reaction to dry and granulate the product (a costly external source of heat is not required.)
6. Extreme flexibility permits the easy manufacture of products of high analysis and conventional ratio.
7. Reduced "fixed" costs and labor costs.
8. Elimination of various other process phases necessary for the conventional manufacture of mixed fertilizers.
9. Conservation of national sulfur resources.

ARK-MO AND SPENCER COLLABORATE ON PRODUCTION OF NEW 14-14-14

A new fertilizer granulating process which reportedly cuts formulation costs considerably—developed jointly by Spencer Chemical Company, Kansas City, Mo., and the Ark-Mo Plant Food Company, Walnut Ridge, Ark. — was announced last month at the Ark-Mo plant when fertilizer manufacturers from 24 states and Canada attended a three-day "Open House" to view the plant in action and receive details on the process.

The granulating operation according to the two companies, appears to offer a combination of quality and decreased cost. In experimental runs, Ark-Mo has been successful in producing 14-14-14 which derives all the nitrogen from a 37 per cent nitrogen solution, departing from the conventional procedure in which it was necessary to obtain some of the nitrogen from ammonium sulphate.

Complete data will de developed later on other grades, a high 1-4-4 ratio, for example.

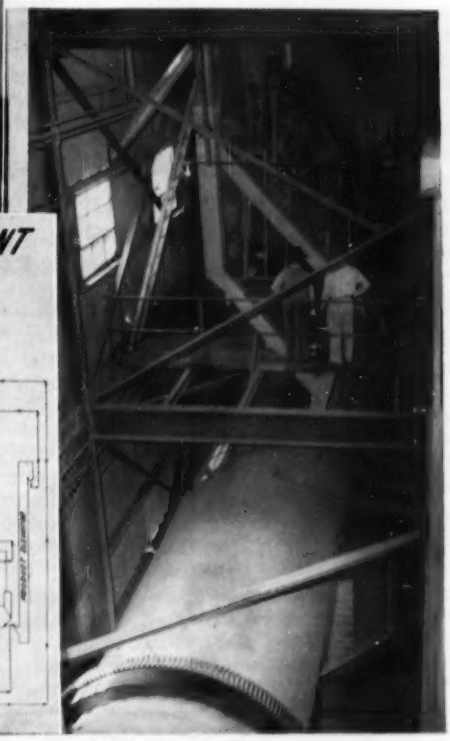
Representatives of Spencer and Ark-Mo emphasized that they are by no means the pioneer in this granulation movement. Some months ago, Spencer technical people developed additional information on granulation to supplement the findings of private companies, the USDA and TVA.

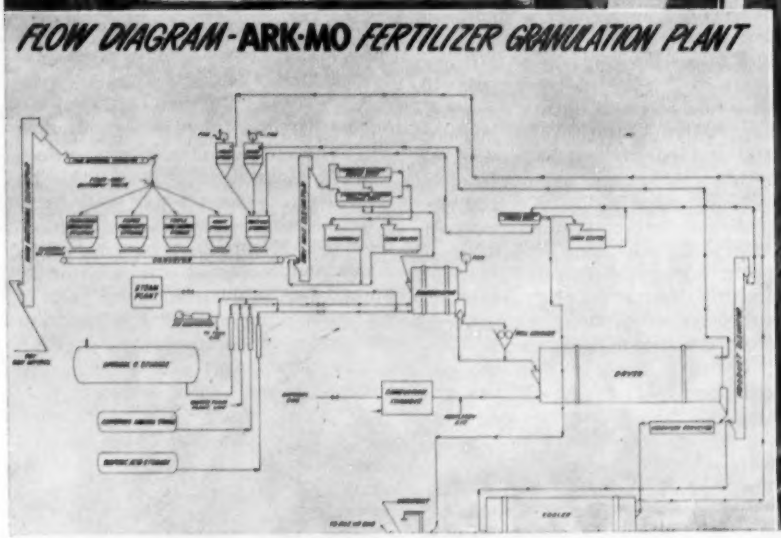
The big secret is accurate control throughout the process. An intricate panelboard records flow of ingredients together with temperatures at various locations in the system. Raw materials are weighed separately by gravimetric feeders. A conveyor belt and elevator carries materials to screens and crushers, where oversized are ground to pass a 10-mesh screen.

The liquids are added in an ammoniator-granulator, the only equipment of special design in the Ark-Mo plant. All nitrogen is derived from ammoniating solutions. From the ammoniator, the material flows to dryer, cooler and finished product screens. Fines are collected and weighed back into the system. High-nitrogen grades are coated with diatomaceous earth on the way to storage. Low-nitrogen grades go direct from process to storage by a belt conveyor belt.

NEW PLANT DESIGN was sparked by Earl Day (left), Ark-Mo; Jim MacArthur, Spencer; Orville Hicks, Ark-Mo, and Joe Sharp, Spencer. Hundreds of man-hours went into the plans for the new fertilizer granulation process, which reportedly cuts formulation costs considerably.

THE AMMONIATOR-GRANULATOR (at top in the right hand picture) is the special feature of the Ark-Mo plant, which was designed by Spencer Chemical Company. In the foreground is a conventional drier.





EASTERN CANADIAN PLANT FOOD PRODUCERS

The effect of growing populations in changing patterns of land use, the rapid deterioration of much of our agricultural land and the increasing importance of commercial plant foods in the successful management of farm lands, were among the vitally important questions affecting Canadian people in town and country that were discussed by well known agricultural authorities at the tenth annual convention of the Plant Food Producers of Eastern Canada, at Bigwin Inn, July 5 to 9th, 1955.

The convention was attended by some 175 delegates and visitors representing Canadian agricultural workers, plant food industry, co-operatives and others. American agricultural colleges and experiment stations, the recently organized National Plant Food Institute, Washington, D. C. and many important companies in the chemical and fertilizer industries of the U.S.A. were also well represented. The growing need for efficient land use and measures for maintaining soil fertility and profitable crop yields in Canada were evident by the well attended meetings and the lively discussions that took place.

Speaking on agricultural developments, the Honorable Fletcher Thomas, Minister of Agriculture for Ontario, stressed the need for giving the farmer every assistance possible in supplying and using plant foods. He challenged the fertilizer industry to render such service to the farmer as would merit the strong support and co-operation of the Ontario Department of Agriculture. The maintenance of soil fertility and the production of profitable crops, were among the most important necessities in Canadian agriculture to-day. As an agency to help in solving soil fertility problems, the speaker announced that the Ontario Government's building programme includes provision for one of the most up to date and modern soils laboratories in North America to be built on the campus of the Ontario Agricultural College at an early date.

Vital changes in Canadian land use, affecting many people, are taking place reported Prof. R. N. Richards, Head of the Department of Soils, Ontario Agricultural College. He emphasized that 99 percent of the population of Canada occupy only one percent of the land area. In the ten year period 1941 to 1951 some seven percent of the agricultural land area has retired from use. Some areas, as that around Toronto and Hamilton are particularly affected. With the prospect of greater industrial expansion and growing populations, problems of adequate land use are becoming much more urgent. A great deal of work is proceeding to meet the needs arising from these changes.

Illustrating the growing importance of commercial plant foods in the United States, Dr. Russell Coleman, Executive Vice-President of the National Plant Food Institute, said that U.S. fertilizer consumption has about trebled during the fifteen years from 1938 to 1954. Total consumption of all fertilizers in 1954 reached 22,000,000 short tons. Available plant capacity for the production of all plant food elements was now more than adequate to meet current needs. The importance of fertilizers as a vital factor, under the control of the farmer, in keeping down costs of production per unit, is increasing. Despite decreases in net farm income and because of this growing importance, in terms of actual plant nutrients, consumption of fertilizer is continuing to increase in many areas.

That there is a great need for expanded scientific research programmes, to keep up with changes in crop production, was emphasized by Dr. L. M. Turk, Director of the Agricultural Experiment Station, Michigan State College, East Lansing, Michigan. The speaker pointed out, for instance, that greater changes had taken place in the past fifteen years in disease and insect control, than had occurred during the previous twelve centuries. The speaker also pointed out that because of the greater occupation of the land by industry, more information is needed regarding the crop production capacity of marginal lands. The losses of plant nutrients from soil by erosion and the destruction of desirable soil structures were among the problems requiring unremitting work.

The great importance of commercial plant foods in dispelling hunger among human populations and in reducing the cost of crop production, was ably discussed by Dr. S. F. Thornton, formerly of the Indiana Agricultural Experiment Station and now an industrial director of chemical control and farm service. A little more than 100 years ago, said the speaker, it was discovered that certain minerals could be added to the soil to increase crop yields. This discovery is among the most important single findings ever made in our effort to adequately feed the peoples of the world and to produce crops efficiently and profitably.

From early beginnings there are to-day several things that can be said about plant nutrients with conviction. Their basic importance, used together, emphasized the speaker, with other modern farm techniques, are to-day enabling the food needs of the people of North America, to be adequately met. Even with all our modern knowledge, however, the farmers in many important crop areas are still applying only about half the amount of plant food recommended by agronomists as the most profitable amounts to use. There is still much to be done in improving the efficient use of commercial plant foods. Speaking of conditions in the United States the speaker said that the fertilizer industry, through its sales and distribution staffs, can do much more to educate the farmer to the profitable use of fertilizer. The supply and use of plant nutrients is a wonderful story. It needs to be told more often, more enthusiastically and more effectively.

G. F. Coope, president of the Potash Company of America, Carlsbad, New Mexico reported that his company was spending some millions in exploring the possibility of mining potash in Saskatchewan. It was necessary, however, to do much more work before answers to many questions could be given. In the meantime the exploration was continuing.

General discussion at the meetings brought out the fact that Canadian fertilizer consumption is now three times greater than in pre-war years. Solving the problems of more effective and increased use is a vitally important problem to many parts of Canada. In doing this, the great importance of continuing cooperation between research and experimental organizations and industry was brought out.

Plans are under way for the organization of programmes for the eleventh Convention of the Plant Food Producers to be held in July 1956 at Mont Tremblant in Quebec.

ARIZONA

Southwest Agrochemical Corp. will start construction soon on a $2,500,000 ammonia plant in the Salt River Valley which eventually is due to turn out 100 daily tons. The company was formed by some 35 Arizonians, and predicts a 56% saving to the stockholders who will buy at plant cost, only surplus going to outsiders, according to **Fred Lauer, Jr.,** vice-president, who made the announcement.

ARKANSAS

Arkansas Plant Food, Inc., Corning, has bought **Blytheville Fertilizer Company,** Blytheville, according to **L. G. Black,** of APF.

CALIFORNIA

Shell Chemical is planning to build at Ventura a urea plant which is slated to have 100 daily tons capacity, and will be the first of its kind west of the Rockies. Raw materials will come from the adjoining Shell ammonia plant, and will be manufactured via the **Montecatini** process. The **M. W. Kellogg Company** is the contractor.

According to vice-president **George R. Monkhouse,** construction will get under way at once and the plant is due in operation by September next year.

Standard Oil's new plant at Richmond is under way, according to word from **M. W. Kellogg Co.,** contractors. The 300 daily ton anhydrous plant will use the Kellogg process of steam methane reforming, and will incorporate a number of innovations which, for example, reduce compressor horsepower needs by 25-35%, and a special quench-type reactor which leads to improved ammonia yields.

* * *

California Spray Chemical are completing a new bio-screening laboratory in a remodeled building of **Standard Oil's** Richmond refinery. It will be used to develop "new, safer and more effective Ortho pesticides," according to the announcement made by **Leo R. Gardner,** manager of research and development.

Cal-Spray has named **Leslie R. Hamilton** to coordinate marketing for their $16,000,000 Richmond plant.

FLORIDA

Superior Chemical and Fertilizer, Tampa, lost a half million dollar stock of raw chemicals and finished crop chemicals in a fire started by lightning July 1. Fumes overcame 22 firemen who ignored the warning issued by President **G. D. Sloan** that masks should be worn because of the parathion present in the building. Apparently none suffered any permanent effects.

GEORGIA

Atlas Chemical Corporation's physical assets were bought by **Charles Daly,** president of **West Coast Fertilizer Co.,** W. K. Aldridge of **McCurdy-Mitchell Supply Co.** and **B. G. Mitchell** of **Mitchell Insecticide Co.** They retained all personnel except manager **John Strickland,** and the operation will remain in Waynesville.

* * *

The F. S. Royster Guano Co. has purchased the fertilizer plant of **The Empire State Chemical Co.,** Athens Ga. Transfer of the property was made effective at the close of business July 15, 1955.

The Athens factory of the Empire State Chemical Co. is one of the largest complete fertilizer units in Georgia, and will enable the Royster Company to more efficiently serve their trade in northeast Georgia, as well as some sections of the Carolinas.

W. J. Cook, who for nine years has been engaged in sales work for Royster in North Carolina and Virginia, has been appointed Manager of their operation in Athens.

The acquisition of this property gives Royster twenty-two factories and fifteen sales offices, serving farmers in twenty states east of the Mississippi River and the Province of Ontario in Canada.

ILLINOIS

DeLand Phosphate Co., DeLand, has purchased a site for a new warehouse and office building, the warehouse for bagged goods and company trucks and other equipment.

* * *

The Buhner Fertilizer Company's general manager, **C. R. Sparks,** has announced a granulating plant for his company. Actual installation work has been underway for several weeks. According to Mr. Sparks, initial operations are planned for this month. Designed and furnished by **The D. M. Weatherly Company** of Atlanta, Georgia, the plant will manufacture a closely sized product at a high rate.

The granulating plant is located at Danville. The original plant went into operation in 1949. Since that time it has been expanded to more than twice the original size.

INDIANA

Kingsbury and Company announce that they will be producing granular fertilizers before the end of this year. George H. Kingsbury, presi-

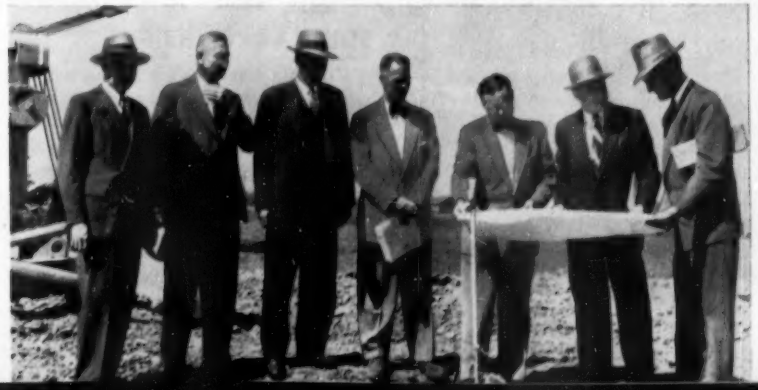
CALSPRAY STARTS WORK ON NEW $16,000,000 FERTILIZER PLANT

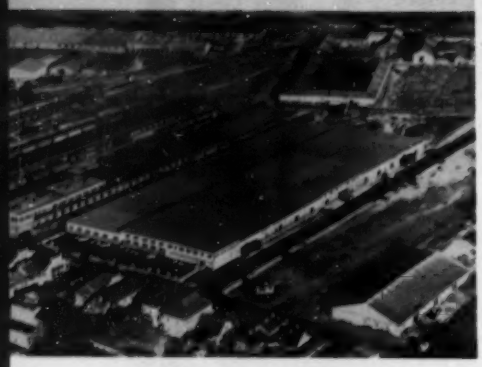
California Spray-Chemical Corporation officials look over the plans for the initial dredging and fill operations at Calspray's new fertilizer plant site in Richmond, Calif. From left to right: L. R. Gardner, Vice-President and Manager, Research and Development; E. W. Cannon, Vice-President and Manager, Marketing; A. W. Mohr, President; C. E. Cody, Regional Manager-West, Marketing; Leslie Hamilton, Coordinator of Fertilizer Operations; P. S. Williams, Vice-President and Chief Engineer; and Calvin Dorough, Superintendent, Fertilizer, Manufacturing.

The four new Calspray fertilizer plants in the $16,000,000, six plant fertilizer project of Standard Oil of California and its subsidiary, Calspray, will be producing fertilizer for the Western farmer by early summer, 1956. The new plants will produce Ammonium Nitrate solutions, Ammonium Sulphate, Anhydrous Ammonia, Aqueous Ammonia, and high analysis pelleted fertilizers.

The pelleted complex fertilizer plant and the ammonium nitrate solution plant will be built by the Chemical and Industrial Corporation of Cincinnati, Ohio. They are the representatives of the French FEC (Potasse et Engrais Chimiques) complex fertilizer process and will build the first PEC fertilizer plant to be built outside of Europe for Calspray's pelleted fertilizer plant.

California Spray-Chemical Corporation are producers of Ortho insecticides—pesticides—fungicides and weed killers, and have pioneered in such developments as a process for manufacturing Flat Lead Arsenate, Lindane insecticide products, and the formulation of TEPP products.





Dedication of Fulton Bag & Cotton Mills' new million dollar New Orleans plant took place with Mayor de Lesseps S. Morrison, (center) cutting ribbon, while Norman E. Elsas, Atlanta, Chairman of the Board of Directors (left) and Jason M. Elsas, Executive Vice-President and New Orleans Branch Manager (right) watch approvingly.

Aerial view of the new plant shows vast area covered by the building, which is 296 feet wide and 715 feet long. This one-floor manufacturing installation occupies 212,000 square feet, making it one of the largest bag plants in the nation.

dent, in announcing this program, said, "We have decided to erect our first plant at Peru. Our new facilities will manufacture at a much higher rate than any in operation today, to the best of our knowledge."

The **D. M. Weatherly Company** of Atlanta, Georgia, according to Mr. Kinsgbury, have been awarded the contract to design and build the plant.

IOWA

H. D. Campbell Company plans a plant to produce liquid fertilizer formulations for direct soil application at Strawberry Point. Campbell headquarters are at Rochelle, Ill.

LOUISIANA

Mid-South Chemical Corporation expansion in the Midwest and South for the marketing of anhydrous ammonia was announced July 16 by **Ellis T. Woolfolk,** president.

It was announced at the same time that **Continental Oil Company** and **Cities Service Company** have acquired an interest in Mid-South.

Under the expanded program Mid-South plans to market anhydrous ammonia, a liquid-gaseous form of nitrogen fertilizer, over a wide area in the Central United States. The company's source of ammonia will be a plant at Lake Charles, which will receive its raw materials from the Conoco and Cities Service refineries there.

"We are delighted to have Cities Service Company and Continental Oil Company allied with us in this expansion plan," Mr. Woolfolk said. "The enlargement of our activities will make possible the orderly marketing of anhydrous ammonia over a much larger area, on a basis that will reflect maximum benefits to the farmer. The experience and resources of two of the nation's leading oil companies will greatly assist Mid-South in reaching this goal."

Mid-South Chemical Corporation now operates in Alabama, Mississippi, Arkansas, Louisiana, Missouri, Kentucky and Tennessee. It marketed 20,000 tons in 1954 and presently has more than 85 distributing stations.

In addition to Mr. Woolfolk, officers of the expanded Mid-South organization are **J. D. Wooten** of Memphis, vice president; **A. P. Frame** of New York, Cities Service Company, vice President; **H. G. Osborn** of Ponca City, Okla., Continental Oil Company, vice president; **John C. Hogan** of Memphis, secretary-treasurer; and **B. M. Scofield** of Lake Charles, **Cit-Con Oil Corporation,** comptroller. Mr. Scofield has moved to Memphis to assume his new duties. **David H. Bradford** is sales manager.

Mid-South headquarters are at 1222 Riverside Boulevard, Memphis.

MARYLAND

Olin Mathieson have introduced "do it yourself" to selling its Ammo-Phos, by setting up a display which enables the customer to test for himself the solubility of the product. Their advertising this year is concentrated on Ammo-Phos.

MINNESOTA

B. F. Wolford has acquired land in Fergus Falls to construct a fertilizer mixing plant of 9,000 square feet floor space, which is due to be in operation by November.

NEBRASKA

Auburn Fertilizer Co., at Auburn, new liquid-mix plant and applicator service on which we reported earlier this year, finds itself well pleased with both the mechanical functioning and the sales possibilities of its operation. Manager **John White** says their first season has indicated a need for more storage space than planned at time of construction. Instead of building the additional storage facilities at the plant site, they are setting up tanks at several points within a 30-mile radius of the plant, and will keep them supplied by transport.

Dale Draper Fertilizer Service has established a liquid fertilizer operation at Eustis.

* * *

Agricultural Chemical and Supply Company which is headed by **John L. Sloane,** well known in the Mid-West, is establishing a liquid fertilizer operation at Geneva.

NEW MEXICO

Kerr-McGee are starting work next month on the first shaft to mine potash in Eddy County. By a year from September they hope to have enough surfaced to keep a refinery going.

* * *

Spontaneous combustion was blamed for two fertilizer fires the same night in different sections of Albuquerque. The victims were **Albuquerque Chemical** and **Rowland Nursery.**

OHIO

Ohio Farmers Grain & Supply Association is installing a new mixed fertilizer granulating plant at Fostoria. **S. E. Salisbury,** general manager, in announcing the program, said that the project was well underway. Foundations are completed. Building modifications should be finished by the first of September at which time final installation of equipment will be made. **The D. M. Weatherly Company** of Atlanta, Georgia is furnishing the granulating plant.

* * *

Ohio Farm Bureau's plant at St. James is coming along so well that it is now estimated that the $1,000,000 operation will be finished by the end of this Summer. **A. J. Sackett** is general contractor.

PENNSYLVANIA

Cornwell Chemical Corporation, who just last year put into production a modern, enlarged, sulphuric unit, have announced additional sulphuric acid facilities at Cornwells Heights, which they report will give them the largest production in the Delaware Valley. Cornwell's main offices are in New York, with sales offices in Cornwells Heights, Philadelphia.

SOUTH CAROLINA

Virginia-Carolina's flambeau, which burns off carbon dioxide on a high tower, creates calls from Charlestonians not familiar with the flaming torch. Passing motorists often stop to tell them the plant is on fire.

Burris Chemical Co., Charleston, has been chartered with $25,000 capital stock to manufacture fertilizer, ingredients and other chemicals. **A. A. Burris** is president.

TENNESSEE

Monsanto is to spend more than $1,000,000 to modernize its phosphate unloading, handling and preparation equipment, install a new craneway and new rotary calcining outfit at the Columbia plant.

TEXAS

Sulphur Exploration is nearly ready to build their sulphur recovery plant on the High Island Dome, Galveston County, the sulphur rights of which they have leased from **Stanolind.**

* * *

Southwest Fertilizer & Chemical Co., El Paso, has been bought by **K. B. Ivey**, cotton farmer, from the Kerley Brothers. The concern has branches in Odessa, Pecos, Clint and Lubbock, and at Anthony, New Mexico. It has assets valued at about $750,000. **W. G. Nelson** will continue as general manager.

Others who have an interest in the company include **John** and **Paul Ivey**, sons of K. B. Ivey.

Officials of the company announced by Mr. Ivey include **N. D. MacAllister**, sales manager; **W. W. Houghton**, credit manager, **B. M. Luttrell**, manager of the El Paso plant; **Jack Humberson**, manager of the Odessa plant; **C. M. Wesson**, manager of the Pecos office; **Ted Flint**, manager of the Clint office; **Alton Bailey**, manager of the Anthony office; and **B. M. Steele**, manager at Lubbock.

The company also operates **Southwest Flying Service** of Pecos, of which **Jim Guest** is manager.

UTAH

Continental Sulphur & Phosphate is in production with its refining plant at Sulphurdale, which has a capacity of 100 daily tons.

* * *

Salt Lake Chemical has postponed indefinitely its plans for an $8,000,000 ammonia plant at Salt Lake City, according to **J. B. Allison**, secretary treasurer at the company's Dallas, Texas, home office.

* * *

Western Phosphates, Inc. has announced plans for expansion of its multi-million dollar ammoniated phosphate and treble superphosphate plant at Garfield, to be completed early in 1956.

According to **Hans Stauffer**, president, the expanded facilities are required to meet the heavily increased demand for phosphate fertilizers in the Western area, despite the fact that the present plan is currently operating 120% of rated capacity.

Wilson & Geo. Meyer & Co., sales agent for Western Phosphates, predict a continued increase in western demand for phosphate fertilizers.

WASHINGTON

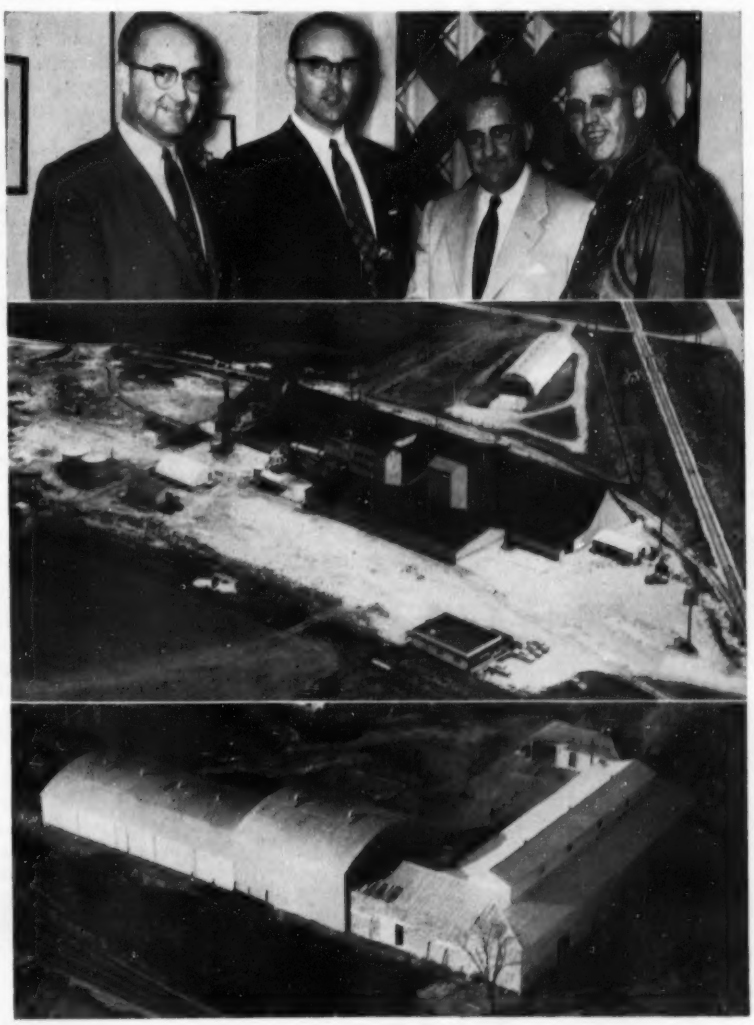
Formation of **Phillips Pacific Chemical Company** which will construct an ammonia fertilizer plant in southeastern Washington has been announced by **K. S. Adams**, chairman of **Phillips Petroleum Company**, and **Ray C. Fish**, chairman of **Pacific Northwest Pipeline Corporation**, which companies will jointly own the newly formed company.

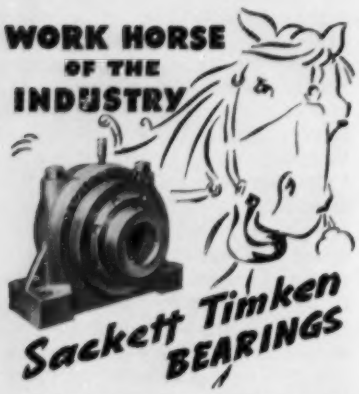
The initial unit of the new plant will produce 200 daily tons of anhydrous ammonia. Phillips Pacific Chemical Company has made arrangements with Pacific Northwest Pipeline Corporation for a natural gas supply of 15 million cubic feet per day for use as the raw material for ammonia manufacture in the first unit of the new plant. The plant will be designed by Phillips Chemical Company and constructed by the **Fish Engineering Corporation.** It is anticipated that the plant will be placed in operation late in 1956, which will enable supplying distributors in the area with fertilizer needed for the spring season of 1957.

Plans for the new ammonia plant were made possible because of construction now under way by Pacific Northwest of a long-distance transmission line from the San Juan Basin of northwestern New Mexico and southwestern Colorado to bring

Nichols Buys Oklahoma Fertilizer & Chemical

The newly formed firm, Nichols Fertilizer and Chemical Company, Oklahoma City has bought Oklahoma Fertilizer and Chemical Co. for more than $750,000. Pictures show, top W. Frederick Nichols, secy-treas.; Earl Nichols, president; Lester E. Cox of O.F.&C.; Keats Soder, broker. Middle: the Big Boy Plant at Lecox, Okla. with 50,000 annual tons capacity. Bottom: The Nichols insecticide, seed-treating and organic-base fertilizer plant at Jones, Okla.





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INDUSTRY CALENDAR

Date	Organization	Place	City
Aug. 14-19	Agronomy, Soil Science	Univ. of Calif.	Davis, Cal.
Sept. 7-9	Nat'l Ag. Chem. Assn.	Essex & Sussex	Spring Lake, N. J.
Oct. 17-18	Fertilizer Safety Section	La Salle Hotel	Chicago, Ill.
Oct. 27	Middle West Soil	Sherman Hotel	Chicago, Ill.
Nov. 2-3	Pacific N.W. Plant Food	Pilot Butte Inn	Bend, Oregon
Nov. 7-8	California Fertilizer Assn.	Mark Hopkins Hotel	San Francisco, Cal.
Dec. 5-7	Ag. Ammonia Institute		Kansas City, Mo.
	1956		
Jan. 4-6	Weed Society of America	New York Hotel	New York, N. Y.
Feb. 15-17	Western Weed Control Conf.	Univ. of Calif.	Davis, Calif.
June 28-30	Soil Control		Roanoke, Va.
July 18-20	SW Grade	Bucaneer Hotel	Galveston, Tex.
July—	E. Canada		Mont Tremblant, Que.

the first natural gas into Washington, Oregon, and Idaho.

* * *

Pacific Supply Corporation, Dayton, has bought land to build a $50,000 fertilizer plant.

CANADA

Sherritt Gordon Mines are giving serious consideration to doubling their ammonia plant at Fort Saskatchewan, Alta., which now is rated at 75 daily tons, but is producing a little beyond this figure.

* * *

Noranda Mines, Ltd. are to build in Algoma, Ont., a multimillion dollar sulphuric acid plant on a 125-acre reserve. The acid is needed by **Algom Uranium and Consolidated Dennison Mines.**

* * *

North American Cyanamid Ltd. was host when more than 50 fertilizer manufacturers from Ontario watched the production of liquid nitrogen and other products of Cyanamid's Welland plant, and then attended the company's 20th annual golf tournament at the Niagara, Ont. course.

FINLAND

Rikkihappo-Ja Superfosfaatitehtaatoy will build a new plant at Kotka adjacent to their present superphosphate plant there.

When it is completed they will close their old plant at Raippo.

PERU

Fertiza Limitada — a $4,000,000 petro-chemical plant is to be built on funds loaned by Italian financial interests, the installation of equipment to be supervised by **Montecatini.** Completion is slated for late next year.

INDIA

Sindri is having new nitrate units built by **Montecatini** which will convert the 10,000,000 cubic feet of coal gas from their coke ovens into 400 daily tons of ammonia nitrate. To cost $14,000,000 the new units will increase Sindri's production by 60%.

ISRAEL

Fertilizer and Chemicals Ltd. has put into production two new plants —one for potassium sulphate, the other for phosphoric acid, at Haifa Bay. A third plant for dicalcium phosphate is in partial operation, and under construction are plants which should be ready by year's end to turn out ammonia, ammonium sulphate, nitric acid and ammonium nitrate.

Lion-Monsanto Merger Plans

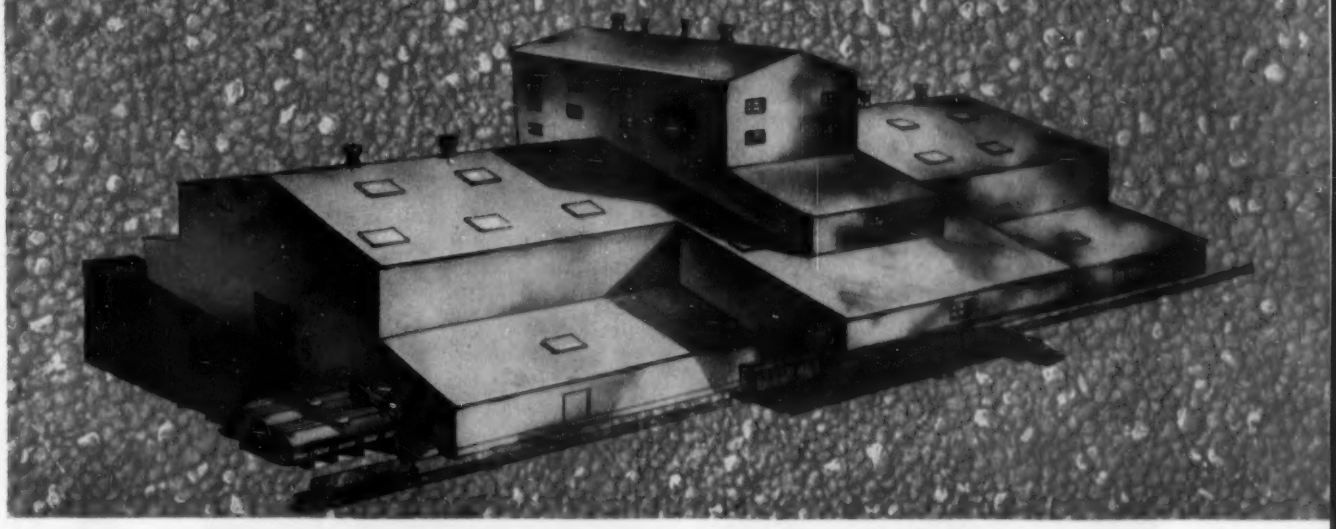
The Boards of Directors of Monsanto Chemical Company and Lion Oil Company July 21 signed an agreement of merger of Lion with and into Monsanto. The agreement will be submitted for approval to stockholders of the two companies at meetings called for September 23.

T. M. Martin, president of Lion, said that more than half of Lion's investment and earnings are chemicals. "We are a large low-cost producer of nitrogenous chemicals—ammonia and its derivatives," Martin said, "which are sold in the chemical and agricultural markets. Monsanto and its associated companies are substantial consumers of ammonia. Monsanto is also a large producer of phosphorus and has developed methods of combining phosphorus with ammonia resulting in concentrated fertilizers in both solid and liquid forms. It is believed that substantial markets for these fertilizers are growing. Monsanto manufacturers herbicides and other agricultural chemicals which would complement Lion's activities in this field."

The identity of the Lion organization will be continued if the merger is approved, and it will be known as "Lion Oil Company, A Division of Monsanto Chemical Company," headed by T. M. Martin as president of the Lion Division. T. M. Martin and T. H. Barton will become members of the Monsanto Board.

The merger, if approved by the stockholders of both companies, will become effective on September 30.

IN NEW PLANTS OR EXISTING ONES



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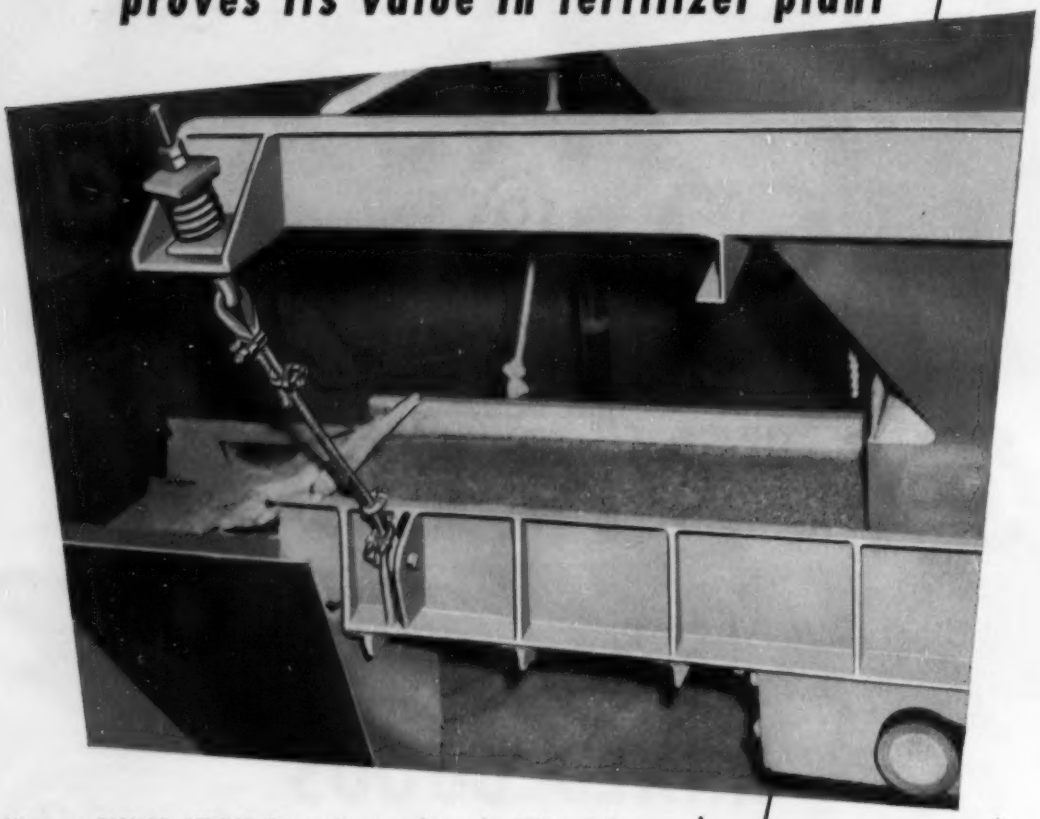

Wisconsin FARMCO SERVICE Cooperative is utilizing this 18" x 6' Simplicity Os-A-Veyor Feeder to feed finished fertilizer from a bin to a bagger. The bagger is operating at 14 bags per minute. The rate of feed is controlled by a gate on the bin.

Simplicity Os-A-Veyor Feeders are designed to handle heavy column loads. They feed along their entire length and allow for the use of a larger bin . . . thus eliminating the problem of material bridging in the bin. Simplicity Feeders may be suspended with spring and cable arrangement from the bin above as shown in the picture, or may be spring mounted. They will feed on the horizontal, as pictured . . . thus requiring less headroom. They feature replaceable liners and can be provided with grizzly or screen sections, one or two decks, and can be totally enclosed. If a screening or feeding problem exists in your fertilizer plant, call on a Simplicity sales representative and find out about Simplicity units, now in wide use throughout the fertilizer industry.

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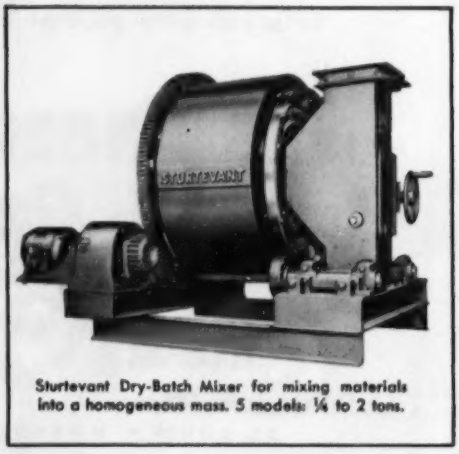

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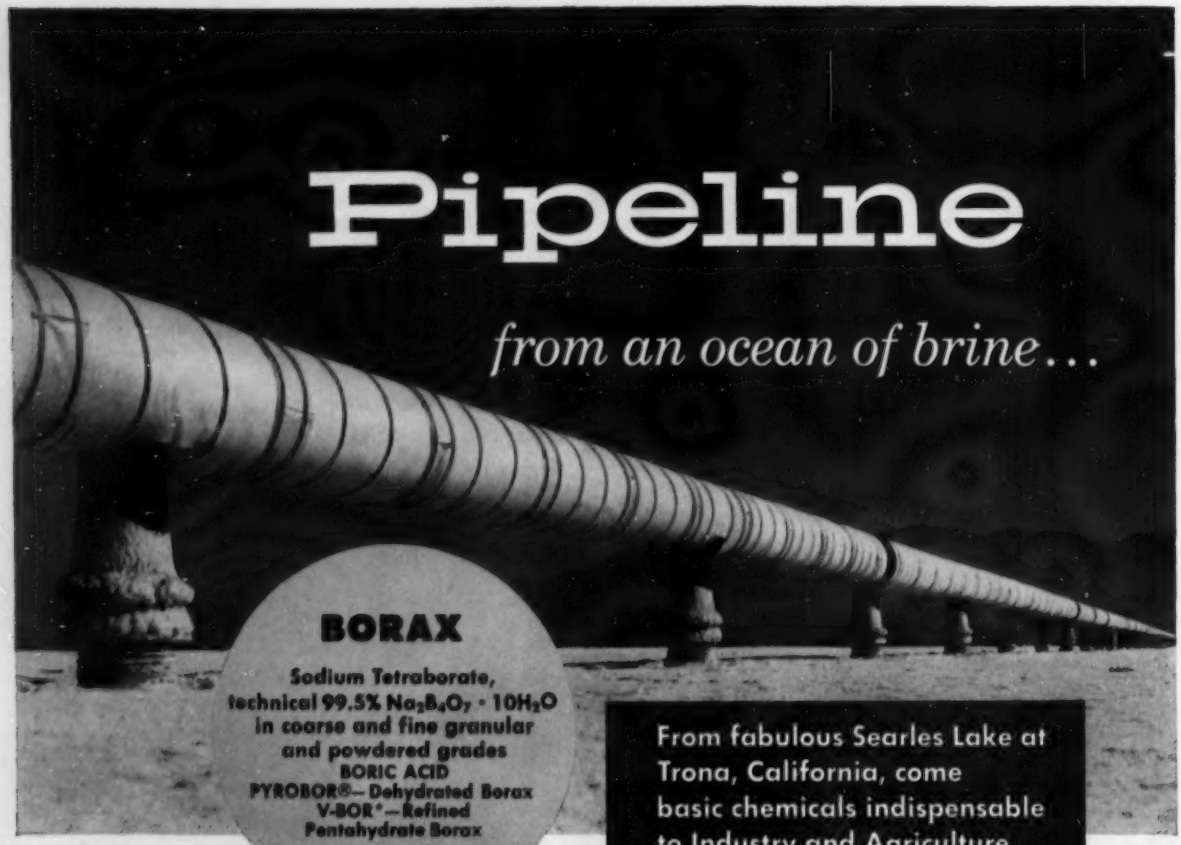

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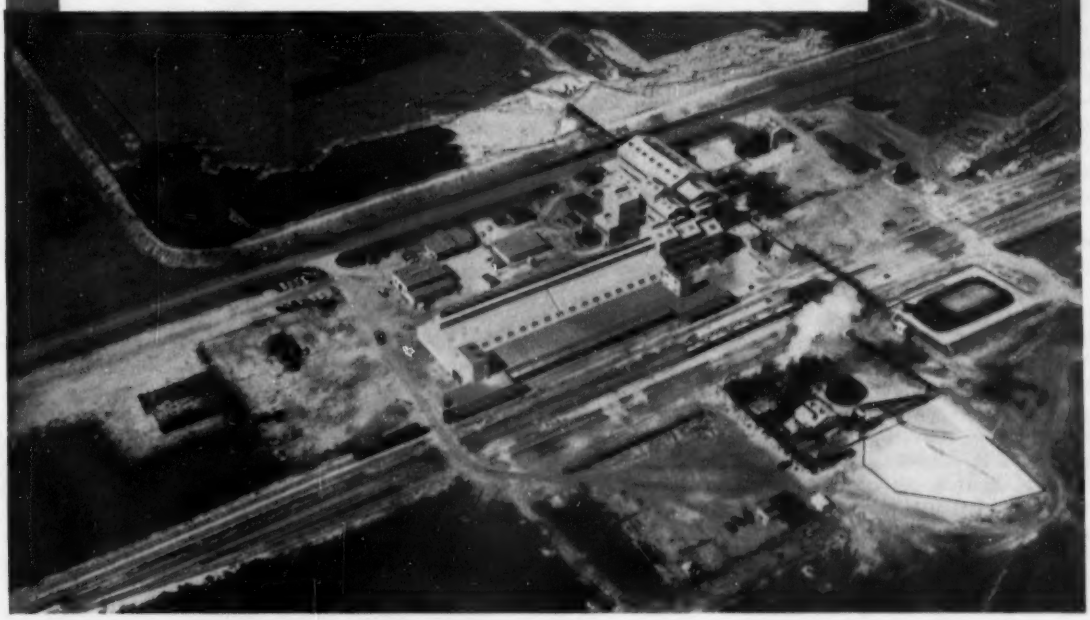

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THE PLACE OF SECTIONAL ORGANIZATIONS IN THE FERTILIZER INDUSTRY

Address by

R. L. Beacher, Arkansas A.E.S.

at Southwest Fertilizer Conference

July 14, 1955

Although considerable progress has been made in increasing national fertilizer tonnage by better educational and promotional programs, still over half of our farmers do not realize that fertilizer alone can increase crop yields and net profits more than any other single operational factor, barring extremely unfavorable environmental conditions. Too many farmers are still not aware of the proven prophecy that the "farmer who fertilizes adequately will live more happily (less worry), live longer (less work, easier farming), die more wealthy, and leave a better piece of land than he started with.

Farmer acceptance of a good fertilization program involves complexity of factors. A survey recently released by M. A. Anderson, TVA and Iowa Exp. Station cooperating, reports the relative importance of these factors influencing farmer acceptance and use of fertilizer in Iowa. Nearly 70% of Iowa farmers used fertilizer in 1952-53, and 87% of these believed that it had a beneficial effect—only 4% thought the effect harmful. Over half of these "users" credited neighbors, friends and other farmers as the cause of their initial fertilizer use; one-fifth of them credited mass media (newspapers, magazines, etc.), leaving only a small percentage responding to the efforts of the dealers, salesmen, experiment station and extension meetings, etc. A surprisingly large proportion (63%) of farmers **not** using fertilizer believed that it had a beneficial effect; only 10% of these farmers believed the effect might be harmful. Obviously a majority of the farmers who are not now using fertilizer are aware of its value, and have a genuine interest in fertilizer use; this awareness and interest has been brought about by mass media. But the following stages—actual trial and acceptance of fertilizer use—do not come about until they hear and see enough from the neighbors and friends and become convinced that fertilizer costs can be justified even under unfavorable farm price conditions. The farmer-neighbor relationship usually narrows down to a relatively few informed farm leaders in every community. These leaders may or may not have good schooling, but their words carry tremendous weight on the street corner or fence row. Consequently it has been the past philosophy of our extension and other government service agencies to work through such farm leaders; when he accepts a practice, the stage is set for mass adoption. The drawback to this situation is that many of our state extension services, experiment stations, other agencies and voag teachers are spread too thin over the entire agricultural field. The county agent or other worker is accepted as the authority on anything and everything. They can actually do but little toward promoting fertilizer use as it needs be promoted, if they must also 'specialize' in insect control, cattle management, silage making, disease control, irrigation and a host of other problems; and the experiment stations cannot concentrate on the promotion program since their hands are more than full with their intended function of fundamental and applied research.

So the field is open and the stage set for an organized effort on the part of industry in forming state fertilizer promotional and educational societies, or soil improvement organizations whatever the name may be. Industry has very effective national organizations, such as the recently merged National Plant Food Institute, and the American Potash Institute and the Chilean Nitrate Educational Bureau. But the national organizations have their purpose in generally gathering pertinent information and funneling it down to local nerve centers where it can be adapted to fit local promotional needs. Unfortunately, these local nerve centers are too often dead or a little rusty, and the informal farm leaders are not reached often enough. If the local interests can be organized into purposeful groups, they can prod each other into accomplishing some astonishing feats. We need everyone concerned with fertilizer use or soil improvement—local industry representatives, government agency personnel, and other interested parties—lined up and pulling on the same chain of promoting recommended fertilizer practices. Such is the place of statewide educational societies.

Some outstanding accomplishments have been made, and are in the making by such state organizations. Older groups, such as the Georgia and South Carolina organizations, have set encouraging examples for the more recently-formed groups in our southwestern states. Here are a few of the general results of state fertilizer education groups thus far:

1/ Considerably improved relationships among competitors. This would be significant achievement in itself in some areas.

2/ A desirable shift of emphasis on some phases of extension and research work, toward more effective extension methods and more applicable soil and fertilizer research. Some state organizations have pushed hard on the demonstration plot technique, and contests among farmers (Georgia, Okla., etc.) Probably these methods constitute one of the most effective approaches we have to arouse farmer interest and encourage acceptance of fertilizer practices on a local level. They keep county agent interest aroused, and may often directly lead to revisions in stagnant research projects at experiment stations. Local educational groups can see that results of such demonstrations are made available to wider areas.

3/ These groups can make available research information in simple forms more appealing and better understood by farmers. Every experiment station has reams of useful information on fertilizer use, possibly covered up in masses of technical or general bulletins of occasional interest and essential for the research worker, but seldom read or understood by the local farm leader let alone the majority of farmers. In many cases the extension services do not have funds or manpower to dig it out. Plant Food societies can instigate a little prodding, in some cases provide necessary funds to get such information put on posters or small pamphlets in simple terms to

reach the small farm leaders on the center square, post offices, banks, feed stores, or over radio and TV. Mass media packs a big wallop if presented in the right places in simple terms.

4/ Finally, active state groups can help crack open some of the hard shells still dragging along in the fertilizer industry and some state or local agencies. If we are ever to accomplish what we hope for the good of our soils and the future of the industry, we will need more open-minded willingness to change. Too-rapid changes can certainly be temporarily disastrous, but resistance to change has held up industry as well as it has many farmers. New advances are coming rapidly—questions are popping faster all along, and becoming more difficult to answer. Some farmers are expensively attempting to answer their own questions by trial and error because they haven't been able to get a good reply from any source. Many farmerse are getting different answers from every source, and losing interest as a result.

We need to get closer together in support of each other. The statewide educational organization can be the most effective tool yet developed to achieve this cooperative effort in pushing proper fertilizer consumption to the point where it should be for the profitable future of our farmers and all peoples.

Pacific Northwest FERTILIZER CONFERENCE

The Sixth Annual Pacific Northwest Fertilizer Conference of the Pacific Northwest Plant Food Association, held in Boise, Idaho on June 28-29-30, drew the largest attendance in its history, with over 200 registered for the three day conference. Rain partially marred the meeting resulting in calling off one of the two field trips, and giving limited time for the other. Nevertheless, those in attendance were given outstanding talks, including one by Dr. Roger Bray of the University of Illinois.

Thursday's session was transferred to Wednesday afternoon due to cancellation of one of the field trips.

C. G. Painter, of the University of Idaho, was Conference Chairman, Assisted by Ralph Nyblad.

The board of directors of the Pacific Northwest Plant Food Association, meeting during the Fertilizer Conference, elected the following as honorary members for their contribution to the Association during the past year: R. A. Pendleton, Thomas Jackson and Dr. Horace Cheney, all of Oregon State College; C. G. Painter and C. O. Baker, University of Idaho; Nels Benson, Agronomist, Wenachee, Washington; Frank Viets, agronomist, Prosser, Wash.; Leroy Warner, Pendleton Grain Conveyors, Pendleton, Oregon; B. R. Bertramson and R. L. Hausenbuiller, Washington State College; and Earl Shaw, Chilean Nitrate Corporation and Chairman of the Soil Improvement Committee, California Fertilizer Association, Los Angeles.

The board also voted to present an award for the Man-of-the-Year to the one contributing the most to the fertilizer industry of the Pacific Northwest. The award will be presented at the annual convention at Bend, Oregon Nov. 2-3rd.

Outstanding among the papers was "Liquid Fertilizers for Direct Application" Prepared by K. D. Jacob and Walter Scholl and Presented by Dr. Jacob of USDA'S Soil and Water Conservation Research Branch, from which the following extracts were taken:

Liquid fertilizers have become of steadily increasing importance in the United States for some 25 years, now rank as major operations in some segments of the fertilizer industry. The evidence points unmistakably to further large expansion in the production and use of such fertilizers.

Liquid nitrogen materials now supply approximately half of the total nitrogen content (778,099 short tons in 1953-54) of mixed fertilizers in the United States and Territories, and the proportion is increasing.

Attention was next focused chiefly on the direct application of liquid nitrogen materials as fertilizers. Use of anhydrous ammonia in this way—initiated on a continuing commercial basis in California in the early 1930's by the Shell Chemical Corporation—was confirmed, at first, mostly to its application in irrigation. Shortly after World War II, however, interest in the injection of anhydrous ammonia directly into the soil was greatly stimulated by the research investigations at the Mississippi Agricultural Experiment Station under the leadership of W. B. Andrews. This practice spread rapidly in the Mississippi Delta States and then to other parts of the country, especially the North Central region.

Domestic manufacture of liquid mixed fertilizers for application to farm crops appears to have had its beginning in California in the early 1920's. Very recently, there has been must interest in applying liquid mixtures directly to the soil, especially in the Middle West.

Thus the total consumption of these nutrients (NPK) rose steadily from about 3.4 million tons in 1946-47 to 5.9 million tons in 1953-54, an increase of nearly 75 percent. During this period the annual consumption of nitrogen increased 136 percent to 1.85 million tons, and the use of potash 110 percent to 1.81 million tons. Phosphoric oxide use rose to a maximum of 2.27 million tons in 1952-53, an increase of 31 percent over 1946-47, and then dropped slightly (to 2.24 million tons) in the following year.

As a result of the growing recognition of the agronomic advantages in properly timed supplemental applications of straight nitrogen materials to many crops, it may be expected that a still larger part of the nitrogen will be used in this way (by direct application). The proportionate use of potash for direct application though very much smaller than that of nitrogen, has also shown continuous increase in recent years.

Liquid fertilizers may be classified in several ways. A convenient classification based on their pressure characteristics affords, also, a partial grouping of the products with respect to their nutrient and fertilizer constituents. A classification of this kind places the products in two main categories — liquefied gases and aqueous solutions—which are further divided into high pressure, low pressure, and nonpressure types.

Anhydrous ammonia, with a gauge pressure of 211 p. s. i. at 104° F., is the only representative of both the liquefied gas and high pressure products.

The aqueous solutions embrace the

low pressure and nonpressure types, and they include single nutrient and multinutrient products. The low pressure type consists of solutions of ammonia alone or with ammonium nitrate or urea, and nitrogen is the only nutrient therein. Although the limits for this group have not been defined specifically, the materials currently used for direct application usually have vapor pressures lower than 25 p. s. i. at 104° F. The nonpressure type comprises a wide variety of products, such as solutions of (a) ammonium nitrate alone or with urea or sodium nitrate, (b) phosphoric acid, and (c) multinutrient fertilizers, including the ammonium phosphates and mixed fertilizers.

Nitrogen is the only plant nutrient supplied by the pressure products currently on the market, whereas the nonpressure products provide one or more of the primary nutrients. Phosphoric acid is the only liquid fertilizer that supplies phosphoric oxide as a single nutrient, but this nutrient is a constituent of the 2-nutrient and the 3-nutrient products. It appears that potash is seldom, if ever, applied as a single nutrient liquid, but chiefly as a constituent of so-called complete fertilizers.

Most of the nonpressure products can be used in all ways of fertilizer application, i. e., addition to irrigation water, surface and subsurface soil placements, and, with proper dilution, as foliage sprays, transplant solutions, and seed treatments. The use of the pressure products is limited, on the other hand, to flood irrigation and to subsurface soil placement, in the latter case to a depth of at least 4 inches for anhydrous ammonia and 2 inches or more for the low pressure solutions.

The total consumption of nitrogen as liquid materials in 1953-54 (337,474 tons) was more than thirteen times the use in 1946-47. Similarly, the consumption of nitrogen as anhydrous ammonia multiplied nearly thirteen-fold, as compared to seventeen-fold for the aqueous solutions. Of the total consumption in 1953-54, 85 percent was in the form of anhydrous ammonia; the proportion in 1946-47 was 88 percent.

In 1946-47 consumption of anhydrous ammonia as a direct application material was confined to three States — Arizona, California, and Mississippi. Use of ammonia in this way was reported for 41 States and Hawaii in 1953-54, i. e., all the States but Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Montana, and Nevada. Except for Montana in 1952-53, no consumption of ammonia has been reported for these seven States in previous years.

As of June 1, 1955, 37 plants for the manufacture of anhydrous ammonia were in operation in the United States. These facilities include a small plant in the West, which was not carried in a previous listing. The total capacity of these plants is estimated to be approximately 2,865,000 short tons of nitrogen. Additional facilities under construction, or scheduled for the immediate future, comprise at least 11 new plants with a total annual capacity of some 680,000 tons of nitrogen.

OUT OF THE FARMER'S HIDE

Any increase in the minimum wage will "come out of the farmer's hide."

H. H. Huddleston, Lamont, Miss., cotton producer, and vice president of the Mississippi Farm Bureau Federation, made this clear in testimony before the House Labor Committee in opposing legislation to hike the present federal minimum wage of 75 cents an hour.

The use of anhydrous ammonia as a fertilizer is fostered by a national organization and by at least seven State and regional groups located in the North Central and West South Central areas: An association to promote the use of nitrogen solutions was organized recently in the Middle West.

The activities of local distributors and independent opplicators undoubtedly have been a highly potent factor in the rapid growth of anhydrous ammonia as a direct application material. It is estimated that in January-June 1954 the gross number of such distributors and applicators, including duplication of those operating in more than one State, totaled 482. Of this number, 171 (the maximum for a region) were in the West North Central States, which was also the leading region in the use of anhydrous ammonia in 1953-54. Other regions having large gross numbers of distributors and applicators, as well as high levels of ammonia use, were the East North Central, East South Central, and West South Central. As to the net number of distributors and applicators in the various States, Iowa led with 90, followed by Mississippi with 50 and Arkansas and Missouri with 37 each.

Compared to anhydrous ammonia, the aqueous solutions have the advantage that they are less hazardous, are more convenient to store, handle, and apply, and are less subject to loss of nitrogen during the operations involved in their use. In large areas of the country, however, the applied-to-the-soil cost of nitrogen as anhydrous ammonia usually is substantially below that of solution nitrogen, which, in turn, generally costs less than nitrogen in solid form.

As reported by several investigators, chiefly in the West, the value of liquid phosphorus acid as a source of phosphoric oxide for plant nutrition is generally the same as that of other water-soluble forms of this nutrient.

As commonly used, the term "liquid mixed fertilizer" embraces all multinutrient solutions, whether the nutrients are supplied by a single compound (ammonium phosphate, for example) or by several compounds.

Although information on the consumption of liquid mixtures is incomplete, estimates based on the most reliable information available at this time indicates that the use of such mixtures totaled some 27,500 tons in 1953-54, of which about 81 percent was in the Pacific region. This tonnage relates to products marketed in liquid form by the manufacturers. Excluded, in so far as possible, are products sold in solid form for conversion into solutions by the consumer. Besides the Pacific States, the East North Central, West South Central, and Mountain regions were the only areas in which the consumption exceeded 1,000 tons. These four areas accounted for more than 95 per cent of the total use. Since considerable additional capacity for manufacture of liquid mixtures has come into production since June 30, 1954, especially in the Pacific and Middle Western areas, the consumption of such mixtures in 1954-55 was undoubtedly much higher than in the preceding year.

According to Slack, there were 144 plants for producing liquid mixtures in the continental United States as of April 1955, of which 76 were in the Pacific region and 25 in the East North Central States. Plants manufacturing mixtures for bulk distribution accounted for nearly half of the facilities, while the others made packaged specialty products.

Products containing all three of the primary nutrients comprised slightly more than half of the 114 grades of liquid mixtures used in 1953-54. Most of the other grades supplied only nitrogen and phosphoric oxide. The grades most widely

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used were 5-10-5, 7-14-7, 8-16-8, 10-5-5, and 15-10-5. Sixty-seven grades were sold in California, the largest number among States.

From the manufacturer's viewpoint, production of liquid mixtures, as compared with solid products, generally has the advantage of lower capital investment and labor costs, and it enables him to cope more effectively with the problems of physical condition and uniformity of composition. On the other hand, the requirement of a high degree of solubility in water greatly restricts the choice of nutrient materials, especially those supplying phosphoric oxide, and severely limits the addition of secondary and trace nutrients. Furthermore, the grades and concentrations of the mixtures that can be marketed from a given plant must be confined to those that will not deposit solids at the temperatures likely to be encountered after the mixtures leave the factory. Other problems include corrosion of equipment and the storage of materials and products.

From the farmer's viewpoint liquid mixtures have the advantage of convenience in handling and application, but his choice of liquids over solids will be governed chiefly by the applied-to-the-soil cost per unit of nutrients in the two forms. Liquid and solid mixtures of similar composition, as regards the kind and quantity of nutrient materials, appear, in general, to be equally effective for the nutrition and production of crops.

Jay L. Haddock, Soil Scientist, USDA, Logan, Utah, spoke on "Estimating The Fertilizer Requirement Of The Sugar Beet Crop."

The use of commercial fertilizers on soils designated for the growing of sugar beets, as well as other crops, rests largely on an empirical basis, he reported. This is satisfactory as a temporary expedient only. Growers should look to a scientific basis from which to determine the fertilizer requirements for their crops.

Additional research is needed on soil analyses and plant tissue analyses in relation to crop response to provide a sound basis for plant nutrition.

G. O. Baker, Professor of Agronomy, University of Idaho, Moscow, Idaho, discussed "Wheat Fertilization In The Pacific Northwest."

The agricultural experiment stations of the Pacific Northwest have been investigating the need of fertilizer on wheat for many years but it has only been in recent years that the farmers have been using appreciable quantities of fertilizers on this crop, he said.

Nitrogen is the main nutrient needed and with the increase in the available supply large tonnages are now being used. There are indications that phosphorus and/or sulphur are needed in some areas. This would indicate that increasing yields by the use of nitrogen may result in other nutrients becoming a limiting factor in such areas.

Rate of application varies widely as it is influenced by the fertility level of soil, cropping sequence, cultural practices, crop rotation practices, climatic conditions, and many other factors.

There is no consistent difference between the various nitrogen carriers as long as equivalent rates of nitrogen are applied in a similar manner and sulphur is not a limiting nutrient.

Results show that there is a residual effect, usually in relation to the rate of application.

David G. Tate, Triangle Dairy, Boise, Idaho, presented a case history of a worn-out farm that was making 30 bushels grain yield and less than 2 tons of hay per acre and building it in 14 years to over 100 bushels of grain, 7 tons alfalfa, and 30 tons of corn silage yeilds through a land improvement program built around leveling, drainage, commercial fertilizers, and dairy cattle.

George Cleveland, Assistant Supt., Caldwell Branch Experiment Station, Caldwell, Idaho, spoke on "Fertilizers' Place In The Production Of Irrigated Pastures."

He discussed pasture management as related to fertility, irrigation and rotation practices, showing that these factors are dependent to a great extent upon one another as affecting production.

Results on pasture yields as affected by manure and commercial fertilizers show, in most cases, yields more than doubled from fertilizer use. The importance of proper pasture management is shown by better utilization of the pasture forage. Under proper fertilization, the grass has grown fast with an abundance of leaf growth making a more palatable grass for grazing.

The rates of fertilizer applications giving the most production for each dollar spent for fertilizer showed that return was greater and more economical in this case on the 50 lb. N/A.

Time of fertilizer applications was discussed. Very little difference can be shown between total yields of these different treatments. The results do show earlier spring grazing from fall applications, but also less late summer grazing; and also a more uniform yield throughout the grazing season from split applications.

The importance of pasture management in controlling bloat was pointed out. Emphasis was placed on heavy application of nitrogen in order to stimulate, and increase, the growth of grasses, thus giving a good balance between legumes and grasses.

Production figures were given showing that this pasture produced 7,917 lb. of 4% fat corrected milk and 317 lb. butter fat. On the basis of $1.10 a lb. for Grade A milk, this pasture produced a gross income of $348.70 per acre per year over a two year period.

The chemical analysis for calcium, phosphorus, and protein was given as affected by fertilizer treatments. It was shown that manure increases the phosphorus content of the forage. Also, the use of phosphorus fertilizer increased the protein and phosphorus content of the pasture, but observation indicated a much higher percentage of legumes in these plots receiving the phosphate fertilizer.

Harold Hansen, Farwest General Agency, Seattle, Washington told about Fertilizer Application By Airplane.

Being a fly-boy myself, I have constantly tried to place myself into the shoes of each one of those people who a lot of other people think of only as crazy daredevils that have in the past been hired to kill weeds and bugs with the full conviction that even if the results were not too thorough, the air circus that was performed in the farmers back yard would probably be worth the cost anyway. Well, I got a big surprise one day when I found out just how smart those aerial cropdusters were really getting—with one exception.

Those boys have been so busy killing weeds and bugs they haven't taken the time to get well enough acquainted with you folks and tell you about how good and how fast they can apply fertilizer.

There has been much written on fertilization and much has been developed involving the airplane. I think the primary importance of the aircraft as a dispersal agent is obvious. The airplane is fast. The airplane is economical. And it can put chemicals on your soil when you can't possibly get another type of vehicle even close to it.

It is true the airplane cannot drill

the fertilizer into the ground. However, with pelletizing and granulation constantly being improved—to say nothing about the advances being made in foliar application—this flying machine is truly a magic carpet.

There is a chap in Burley, Idaho, who for several years with only the assistance of one man to help him load, applied 200 pounds of fertilizer per acre to land being used for potato production. This one man, with one airplane, applied 60,000 pounds of fertilizer per day to 300 acres of land. How much equipment, time and personnel would be required to duplicate this by ground methods? And what would happen if you wanted to make a ground application at the time of year the soil was real soft—when the moisture would carry the fertilizer deep into that soil the best?

There are other phases of the airplane utilization that are fabulously interesting. Forest fertilization is a good example, but most of you are not concerned with that sort of thing, so we'll skip over to something with which you possibly might be very interested. I refer to rangeland fertilization.

Rangeland by its very name indicates large expanses and that means lots of area that should probably all be treated within a very short interval of time to obtain maximum utilization of other factors simultaneously available.

Coupled with this is an extremely interesting development connected with the increasing use of trace elements as boosters and to trigger the big four. In New Zealand a year or so ago, airplane application of 2-½ ounces of sodium molybdate per acre raised the carrying capacity of cropped-out soils from **one** sheep on Twenty Acres to **two** or **three** sheep Per Acre. New Zealand farmland values have been increased from an average of $8 to $10 to $100 to $120 per acre.

Statistics are always debatable—and despite the fact someone once said that there are three kinds of liars in the world—little white liars — damn liars — and statistics; I thought you might be interested in the following figures, the source of which is the Civil Areonautics Authority. The figures are a little old—they are for the year 1951—but when it is realized that the 1954 total operations were approximately three times the 1951 totals, the magnitude of the role of the airplane commences to take shape:

(Continued on page 64)

Winner of the 1955 Agronomy Achievement Award for students at Alabama Polytechnic Institute is James Rudolph Williams, of Castleberry, Alabama (left), who is shown receiving a cash award of $200 from Dr. Willard H. Garman, chief, agronomic relations, for the National Plant Food Institute, the sponsors of the award.

Mr. Williams is a senior in the API School of Agriculture, at Auburn. An outstanding student, he received the freshman and sophomore Sears-Roebuck scholarships. In his junior year, he was awarded the Alabama Seedsmen Association's scholarship. He was active in organizing the Agronomy Club on the campus, and worked as a student analyst in the Soils Research Laboratories.

In addition to receiving a cash award, Mr. Williams will have his name engraved on the NPFI Agronomy Achievement Award plaque. The first recipient was George M. Anderson, of Coffeeville, who was graduated with honors in June at the Alabama Polytechnic Institute.

AWARDS

Mrs. Anna Jim Erickson, extension information specialist at Washington State College, was presented the AAACE-National Plant Food Institute Award July 26 at a special luncheon ceremony in the Fontenelle Hotel, Omaha.

Announcement of the award was made by William B. Ward, chairman of the Department of Extension Teaching and Information at Cornell University and President of the American Association of Agricultural College Editors which held its annual meeting there.

Mrs. Erickson was presented a $500 check and a scroll by Louis H. Wilson, Secretary and Director of Information for the National Plant Food Institute, Washington, D. C.

Purpose of the award is to provide an opportunity for the member of the association who has shown notable growth in competence and achievement in agricultural communications to receive advanced professional improvement training in some phase of agricultural information work.

Mrs. Erickson was selected to receive the first annual award for her outstanding achievement in interpreting and reporting agricultural and home economics developments affecting Washington farm families, and for initiating and carrying out an effective informational training program for county extension agents and 4-H Club leaders.

A graduate of Southeastern State Teachers College, Durant, Oklahoma, Mrs. Erickson holds a Master's degree in journalism from the University of Oklahoma. She worked for a newspaper and served as an information specialist for the Arkansas Extension Service and the U. S. Department of Agriculture prior to assuming her present position in 1947.

Judges of the national contest were C. M. Ferguson, Administrator of the Federal Extension Service, U. S. Department of Agriculture, Washington, D. C.; Earl McMunn, President of the American Agricultural Editors' Association, Cleveland, Ohio; and Frank Atwood, President of the National Association of Television and Radio Farm Directors, Hartford, Connecticut.

Louis H. Wilson, Secretary and Director of Information for the National Plant Food Institute, Washington, D. C., July 27 was presented the Reuben Brigham Award by the American Association of Agricultural College Editors "for meritorious service to agriculture" at their convention in Omaha, Nebr.

The presentation was made at the concluding banquet session of the Association, membership of which comprises the extension and experiment station editors of the Nation's land-grant colleges. The award is given annually by AAACE to a non-member of the Association in the fields of agriculture or home economics, who has made outstanding contributions in the public relations and journalism professions. The award is a memorial to Reuben Brigham, one of the founders of the Association, and is the highest award the association can bestow on a non-member. This is the first year the award has been made to a representative of the agricultural trade.

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300 AT Southwestern CONFERENCE

Three hundred Fertilizer Manufacturers, Control Officials and College men and wives from the five Southwestern States of Arkansas, Louisiana, New Mexico, Oklahoma and Texas met at the Buccaneer Hotel July 13-15 for their twenty ninth Annual Southwestern Conference and Grade Meeting. The attendance broke all previous records and it was the consensus of opinion that more enjoyment was realized and more interest fostered than ever before. Aside from the routine business there was plenty of deep sea fishing, swimming, golfing, dancing, etc.

The afternoon of July 13 was set aside for registration with a social get-together the evening of July 13. A full program was presented during the morning of July 14. Stanley Hackett, President of Dixie Fertilizer Company, Shreveport, Louisiana and Chairman of the Program Committee presided over the meeting. Roy Clough, Mayor of Galveston gave the welcome address. Dr. R. L. Beacher, University of Arkansas, spoke on the ramifications of Plant Food Educational Society activities and potentialities.

Dr. Russell Coleman, Executive Vice-President of the National Plant Food Institute spoke on future probable trends of fertilizer consumption, farmer income and the ratio of mixed grades to materials. Dr. R. C. S. Young, originally from Scotland and presently with the University of Georgia, gave a dynamic and soul reaching talk on "Why I am an American."

The afternoon of July 14 was divided into a social, luncheon, and card game for the ladies and a golf tournament for the men. The evening followed with social hour, banquet, and dance.

Control officers appearing before the fertilizer manufacturers at the July 15 Grade Meeting were Dr. D. A. Hinkle, Fayetteville, Ark.; Dr. M. B. Sturgis, Baton Rouge, La.; R. W. Ludwick, College Station, N. M.; Parks Yeats, Oklahoma City, Okla., and Dr. J. F. Fudge, College Station, Texas.

It was resolved that the meeting would be held in 1956 at the Buccaneer Hotel, Galveston, Texas, July 18, 19 and 20. Stanley Hackett, Dixie Fertilizer Co., Shreveport, was appointed to serve as Chairman of the 1956 program committee and the following were selected to serve with Mr. Hackett: W. S. Tyler, Longhorn Construction Co., Sulphur Springs, Texas; Don Miller, Armour Fertilizer Works, Houston, Texas; Harold Trammell, Farmers Fertilizer Co., Texarkana, Texas, and Jack Lindsey, International Minerals & Chemical Corporation, Shreveport, La.

During the course of the Conference, the Arkansas Plant Food Educational Society and the Texas Plant Food Educational Society had separate meetings to project future plans. Officers and Directors meeting with the Arkansas Plant Food Educational Society were Bill Dunklin, Planters Fertilizer & Soybean Company, Pine Bluff, Ark., President; R. M. Morehead, Olin Mathieson Chemical Corp., Little Rock, Ark., Vice-President, and Lloyd Dhonan, Arkansas Plant Food Co., North Little Rock, Ark., Secretary-Treasurer. Directors attending were Rex Morgan, Ark-Mo Plant Food Co., Corning, Ark.; Z. H. Calhoun, The Southern Cotton Oil Co., Little Rock, Ark., and Douglas Kelly, Jr., Lion Oil Company, El Dorado, Ark.

Officers of the Texas Plant Food Educational Society are: President, B. L. Henderson, Campbell Fertilizer Co., Houston, Texas; Vice-President, Sherman Clark, Texas Gulf Sulphur Co., Houston, and Secretary, Dr. Niven Morgan, American Potash Institute, Shreveport. The Texas Educational Society resolved to support the Extension Service in helping the County Agents to develop a general program of soil improvement, help the National Plant Food Institute prepare and distribute a leaflet on the economics of fertilizing crops of Texas, and to promote the art work of the Texas Extension Service showing good fertility practices on company calendars or other advertising media.

Texas Plant Food Educational Society Panel Meeting: Back row: Dr. W. H. Garman, Nat'l. Plant Food Institute, Washington, Floyd Parker, Central Texas Fertilizer Co., Commanche, Tom Wright, Texas Farm Products Co., Nagodoches, Dr. J. B. Page, College Station, Texas, Duke Thornton, College Station, Tex., Dr. Jim Hildreath, College Station, Texas, Dean Smith, Hi-Yield Fertilizer Co., Bonham, Harold Trammell, Farmers Fertilizer Co., Texarkana,; Front row: B. L. Henderson, Campbell Fertilizer Co., Houston, Pres. Texas Plant Food Edu. Society, Sherman Clark, Texas Gulf Sulphur Co., Houston, Vice-Pres., and Dr. N. D. Morgan, American Potash Institute, Shreveport, and Secretary, Texas Plant Food Edu. Society.

KEY TO PICTURES

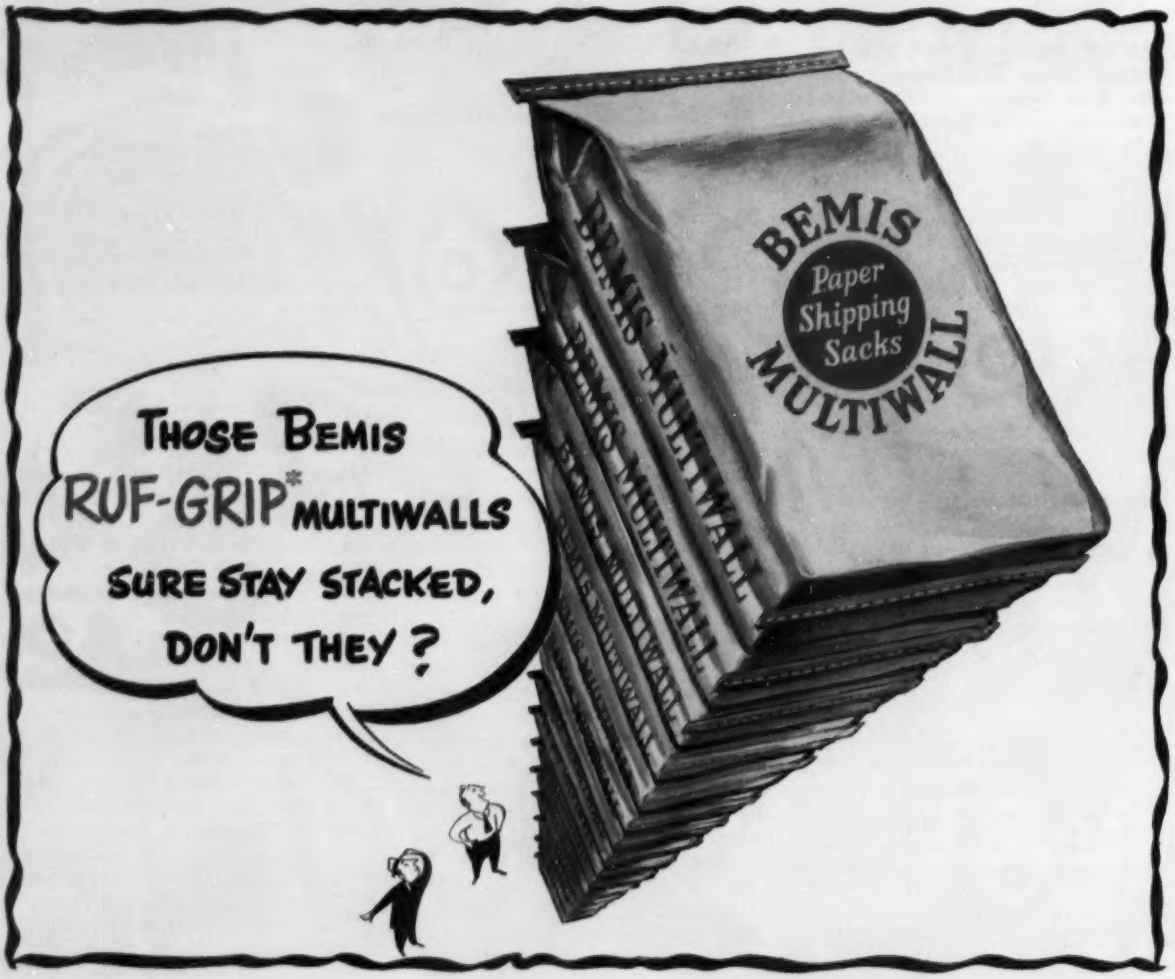
1. Mr. & Mrs. M. G. Fields, and daughter Mary Lou.
2. M. K. McConnell, Commercial Solvents, Sterlington, Dick Johnson, Lion Oil Co., New Orleans, Mr. & Mrs. Warner Anthony, Farm Service, Inc., Opelousas.
3. Ivan Gilmore, El Dorado Fertilizer Co., El Dorado, Allen Jackson, Fertilizer Equipment Sales Co., Atlanta, Z. H. Calhoun, Southern Cotton Oil Co., Little Rock, A. O. Hallman, Blytheville Fertilizer Co., Blytheville, E. O. Baber, Chilean Nitrate Sales Corp., Little Rock.
4. Clair Dyer, Int. Minerals & Chem. Corp., Chicago.
5. Mr. & Mrs. Stanley Hackett, Dixie Fertilizer Co., Shreveport, Dr. M. B. Sturgis, Louisiana State University, Baton Rouge.
6. Millard Perkins, Asst. Comm. La. State Dept. of Agriculture, Baton Rouge, Mrs. J. H. Sharp, Baton Rouge.
7. Dr. W. H. Garman, Nat'l. Plant Food Inst., Washington, B. L. Henderson, Campbell Fertilizer Co., Houston, Dr. Paul Talley, Lion Oil Co., El Dorado.
8. Floyd Prather, Central Texas Fert. Co., Commanche, Sherman Clark, Texas Gulf Sulphur Co., Houston, B. L. Henderson, Campbell Fertilizer Co., Houston.
9. S. B. McCoy, International Minerals & Chemical Co., Chicago, J. B. Snell, Minden Cotton Oil Co., Minden, Jud Drewry, International Minerals & Chemical Corp., Shreveport.
10. Bob Linderman and Sid Keel, International Minerals & Chem. Corp., Chicago, Allen Keel, Hercules Powder Co.
11. Mrs. Douglas Kelly, El Dorado, Robert Harding, Valley Fert. Co., Greenville, Miss., J. K. Sparkman, Jr., Bradley & Baker, Houston.
12. Mr. & Mrs. Lee Alberts, Southwest Potash Corp., Mr. & Mrs. Arnold Neumann, Red Star Fert. Co., Sulphur Springs.
13. Stanley Hackett cuts a mean tango step with Mrs. Lee Alberts.
14. Russell Barrow, Barrow Leavy Investment Co., & Shreveport Fertilizer Co., Shreveport, John Zigler, Int. Minerals & Chem. Corp., Chicago, Ill.
15. Bill Crady, U. S. Potash Co., Harold Hamby, Chilean Nitrate Sales Corp.
16. Dr. N. D. Morgan, American Potash Inst., Shreveport, Joe A. Marsalis, Chilean Nitrate Sales Corp., Athens, La.
17. Mrs. Tom Wright, Nagodoches, Jack Lindsey, Int. Minerals & Chem. Corp., Shreveport.
18. Mrs. Jas. Dawson, Houston, Mrs. Bill Burns, Texarkana.
19. Mr. & Mrs. Gerald Wakefield, Olin Mathieson Chemical Corp., Little Rock.
20. Dan Van Aken, Spencer Chemical Co., Kansas City.
21. Shelton Appleton, Potash Co. of America, Shreveport, Jimmy Powledge, Mgr., Buccaneer Hotel, and Sec. of the S. W. Fertilizer Conference.
22. Defeated in golf, but happy — Bob Linderman, Bill Borg, and Ed Anderson, all with International Minerals & Chemical Corp.
23. George Condos, President, Wonder Gro Chemical Co., San Antonio.
24. Dr. J. B. Page, College Station, Texas.
25. Bill Threadgill, Spencer Chemical Co., Memphis, Gedge Gayle, Kelly, Weber & Co., Lake Charles.
26. Bill Dunklin, Planters Fertilizer & Soybean Co., Pine Bluff (also president of Arkansas Plant Food Educational Society).

Fertilizer Suppliers Make Fortune Top-500 List

The Fortune Magazine directory of the 500 largest U. S. Industrial Corporations lists 31 concerns that are advertisers in Commercial Fertilizer magazine.

New Liquid Fertilizer Applicator

A new device for applying liquid nitrogen, developed through State-Federal agricultural research, offers small farmers a way to take advantage of this type fertilizer, the U. S. Department of Agriculture reports.



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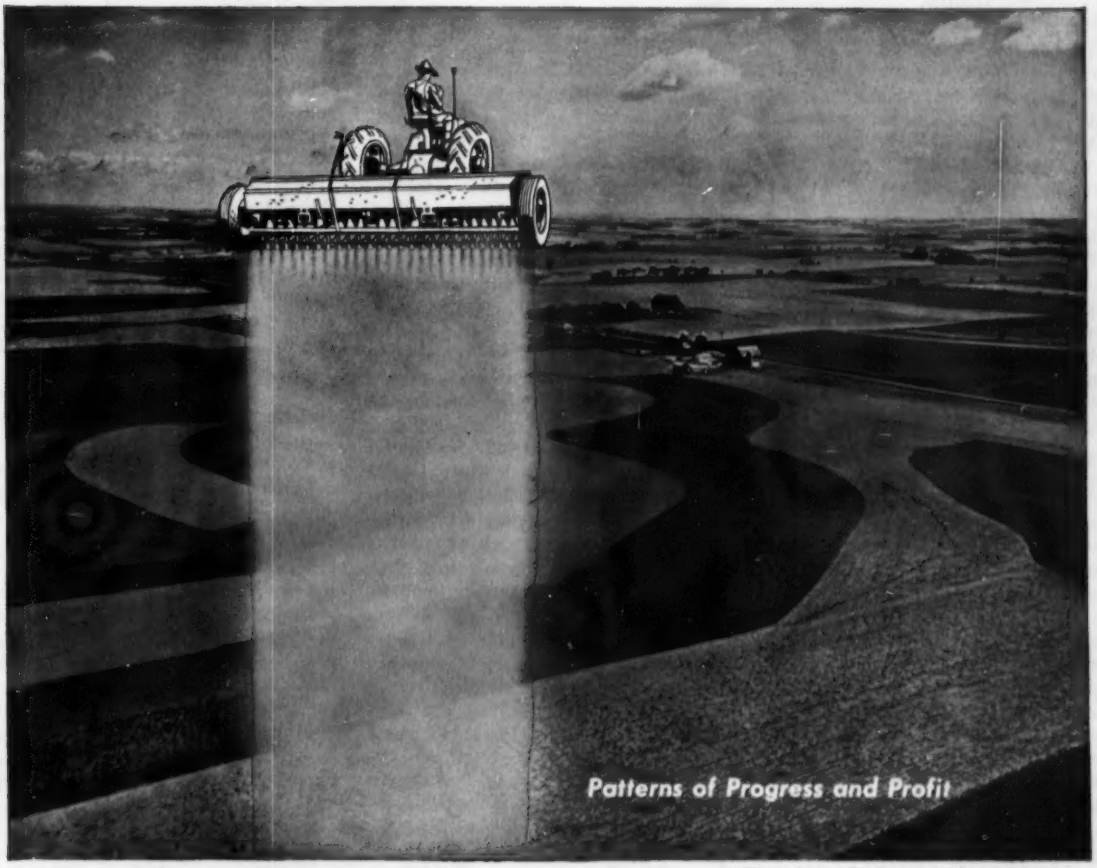

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ETHEREDGE, HEADING SOUTHERN CONTROL GROUP, APPOINTS COMMITTEES

The Association of Southern Feed and Fertilizer Control Officials elected Dr. M. P. Etheredge of Mississippi State College, president when they met in New Orleans.

Other officers elected at the close of the 13th annual meeting included R. W. Ludwick, State College, N. M., vice president and Bruce Poundstone, University of Kentucky, Lexington, secretary-treasurer.

The executive committee included Bruce Cloaninger, Clemson College, Clemson, S. C.; H. H. Hoffman, Florida State Department of Agriculture, Tallahassee, Fla.; Dr. E. W. Constable, North Carolina Department of Agriculture, Raleigh; N. L. Franklin, Virginia State Department of Agriculture, Richmond, and E. A. Epps of Baton Rouge, the retiring president.

Dr. Etheredge announces the following committee appointments to serve the association for 1955-56:

Feed Committee, Bruce Poundstone, Kentucky, ex-officio chairman; E. A. Epps; Harold Hoffman, Florida; W. J. Huffman, Mississippi.

Fertilizer Committee, Bruce Cloaninger, chairman; Dr. J. F. Fudge, Tex.; L. C. Jacobs, Tenn.

Pesticide Committee, Rodney Berry, Va., chairman; Clyde Bower, Okla.; Dr. Henry DeSalvo, Ark.

Constitution & By-Laws Committee, Dr. Constable, chairman; Miss Frances Bonner, Louisiana; Dr. Willis Richerson, Oklahoma.

Editorial Committee, F. D. Brock, Texas, chairman; James C. Oswald, Georgia; John Reitzel, North Carolina.

Nominating Committee, Parks Yeats, Okla., chairman; George Marsh, Ala.; and Joe Taylor, Fla.

The '55 meeting of the Southern Association will be held in Roanoke, Va., June, 28, 29, 30. President Etheredge has asked the chairmen of Feeds, Fertilizers and Pesticides to be responsible for their respective programs in Roanoke. This is also a departure from previous meetings; it should create more interest and prove to be more satisfactory.

Wisconsin Applicators Form State Association

Wisconsin dealers in anhydrous ammonia for direct application completed plans at a meeting in Madison July 11 to form a state trade association. The association, which will be concerned largely with education, anticipates working more closely with state officials and the University of Wisconsin extension division on mutual problems.

Roland Strid of the Strid Grain Company, Green Bay, was named chairman of a committee which will draw up charter provisions and by-laws and set a date for their consideration by the group. Others on the committee are G. A. Davidson, Coulee Chemical Co., La Crosse; Del Christiansen, Lion Oil Co., Janesville; Robert Howard, Baldwin Liquid Fertilizer Company, Baldwin, and Bruce O'Connor, O'Connor Oil Company, Fond du Lac.

E. W. Thomas of the Farm Service Corporation, Boonville, Mo., a past president of the Agricultural Ammonia Institute and chairman of its insurance committee advised the group on how to study their insurance problems as most dealers do not know the coverage they should carry. Advice on insurance coverage is available from the A.A.I.

Dr. Arthur M. Smith of Baltimore, Agricultural Director, Olin Mathieson Chemical Corporation, was featured speaker addressing the group on the outlook for the anhydrous ammonia industry.

Frank J. Bishop, chief boiler inspector for the Wisconsin State Industrial Commission discussed the Anhydrous Ammonia Code which the Commission will issue later this year.

Jack Criswell of Memphis, executive secretary of the national Agricultural Ammonia Institute, assisted the group in formulating its organization plans.

Soybean Meeting August 29-31

Joint annual meetings of the American Soybean Association and the National Soybean Processors Association will be held in Cincinnati, Ohio, Aug. 29-31, Geo. M. Strayer, executive vice president of the American Soybean Association, and R. G. Houghtlin, president of the Processor Association, have announced.

Meeting headquarters will be the Netherlands Plaza Hotel.

The two organizations held their first joint meetings at Memphis, Tenn., in 1954.

S.W. Officers And Speakers

1. Officers of the Texas Plant Food Educational Society: Sherman Clark, Houston, Vice Pres., B. L. Henderson, Houston, Pres., and Dr. Niven Morgan, Shreveport, Sec.
2. Dr. Russell Coleman, Nat'l. Plant Food Institute, Washington, Rex Morgan, Ark-Mo Plant Food Co., Corning, Ark.
3. Galveston Mayor, Roy Clough, gives address of welcome.
4. Dr. J. F. Fudge, State Chemist College Station, Texas.
5. Dr. R. C. S. Young, Atlanta Div. University of Georgia, delivers principal address on July 14th.
6. Parks A. Yeats, Director, Feed & Fertilizer Div., State Dept. of Agric., Oklahoma City.
7. Dr. R. L. Beacher, University of Arkansas, Fayetteville, delivers talk.
8. R. W. Ludwick, American Association of Fertilizer Control Officials, State College, New Mexico.
9. James Dawson, Fidelity Chemical Co., Houston, gives response.

18 LAND-GRANT COLLEGES AT *Symposium*

By E. L. Baum, Agricultural Economist
Agricultural Economics Branch, T.V.A.

The three-day symposium on the Methodological Procedures in the Economic Analysis of Fertilizer Use Data held in Knoxville, June 14-16, was attended by agricultural economists, agronomists, and statisticians from 18 land-grant colleges. One of the themes of the symposium was the need for greater interdisciplinary research by land-grant college scientists.

The schools represented were: Alabama Polytechnic Institute, University of Connecticut, University of Georgia, University of Kentucky, University of Idaho, University of Illinois, Iowa State College, University of Massachusetts, Michigan State University, Mississippi State College, North Carolina State College, Ohio State University, Oklahoma A & M College, Pennsylvania State University, Purdue University, University of Tennessee, Texas A & M College, and West Virginia University.

Also, there were representatives of the U.S.D.A. in attendance.

In addition, the following persons represented fertilizer firms: Commercial Solvents Corporation, Charles D. Goodale; Olin-Mathieson Corporation, Ivan E. Miles, Arthur M. Smith, and W. F. Watkins; Tennessee Corporation, A. A. Nikitin; and Spencer Chemical Company, A. B. Beasley.

Dr. F. A. Gilbert represented the Battelle Memorial Institute, Columbus, Ohio; and Mr. R. O. Lawhon represented the Southern Railway System, Atlanta, Georgia.

Foreign visitors included Martin Yeh, Formosa; William Mills, Uganda, East Africa; C. F. Charter, Gold Coast, Africa; and Herbert W. Butt, Hyderabad, India.

Dr. Travis P. Hignett, Chief, Development Branch, Division of Chemical Development, TVA, discussed changes in fertilizer production and use trends, technological innovations in fertilizer production in last decade, and the economic and technological implications of our rapidly changing economy.

Dr. Earl O. Heady, Professor of Economics at Iowa State College, presented two papers. In his first paper he discussed methodological problems in the study of the economics of fertilizer use. He indicated that the central methodological problem in fertilizer use is prediction of the mathematical form and the probability distribution of the fertilizer response function.

He presented other methodological problems which are auxiliary to this central problem, for example, (1) the design of experiments to allow efficient prediction of the fertilizer response function, and (2) the estimating procedure for predicting the fertilizer response surface and economic optimum use of plant nutrients. In general, this paper focused its main attention on the fundamental and basic problems which relate to estimating design and estimating procedures to fertilizer response functions.

Dr. Heady postulated that it is not inconceivable that soil typing and classification might be highly related to the fertilizer production function. For example, with other inputs specified, economic distinction need not be made between soils where incremental response for parallel fertilizer inputs are the same. While they may be complex, steps to incorporate this concept into fertilizer research would abbreviate the need for considering experiments at isolated locations and in particular areas as unrelated facts.

Dr. Heady's second paper dealt with commercial fertilizer use in relation to conservation farming and allocation of resources within the farm. In this talk Dr. Heady pointed out that fertilizer is a resource which can give returns in a relatively short period of time. Because of this reason it can be used advantageously as an income complement in those major farm adjustment problems, most of which involve a considerable time spand for investment and before important changes are made to income. Some examples include: (1) Adjustment from cash crops to livestock farming in the Southeast. Not only is a large increase in funds needed for this type of change, but also establishment of pastures, erection of buildings, and creation of livestock herds require from five to ten years before operations can get into high gear. (2) Adjustment from exploitive to conservation systems in the Midwest. (3) Adjustments from dry land to irrigation farming. In these types of adjustments sacrifices in income are made as land is planted to forage or nurse crops, rather than to immediate cash return crops. Income is not replenished immediately by the livestock or soil development investments which require several years for their outturn of market product. A resource such as fertilizer, with a relatively short period for transforming investment into profit, can help overcome some of these effects and facilitate adjustments.

Dr. Glenn L. Johnson, Professor of Agricultural Economics at Michigan State College, presented a paper titled "The Political Economics of Designing Experiments to Study the Profitability of Fertilizer Use." In this presentation Dr. Johnson stressed the need to look at fertilization research from an agriculturalist's viewpoint rather than from the narrow confined viewpoint of the farm management specialist, the soil specialist, the marketing specialist, the mathematical statistician, or the specialist in leguminous nitrogen fixation. In general, they recognize that in order to secure meaningful results from fertilizer use research, greater coordination among the many interested agricultural specialists is needed. He discussed the many problems related to securing greater coordinated efforts in this type of research and means by which agricultural scientists can compromise, narrow interests, and conduct fertilizer use research effectively.

Dr. Clifford Hildreth, Department of Agricultural Economics at North Carolina State College, and Drs. R. L. Anderson and David D. Mason, of the Department of Experimental Statistics at North Carolina State College, presented papers dealing with experimental designs and related to mathematical and statistical problems in developing sound fertilizer use response research.

Dr. John T. Pesek, Department of Agronomy, Iowa State College, presented a paper dealing with agronomic problems in securing fertilizer response data that economists deem necessary for meaningful economic analysis. Dr. Pesek indicated the desirability of cooperating economists to become better versed in agronomic techniques and for agronomists

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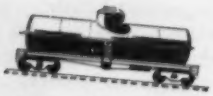

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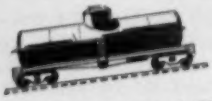

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Front row, sitting, L to R:—D. D. Mason, North Carolina State College, E. L. Baum, Div. Agric. Relations, TVA, John T. Pesek, Iowa State College, Frank F. Bell, University of Tennessee, and Leland G. Allbaugh, Div. Agric. Relations, TVA. Rear standing, L to R:—Roger C. Woodworth, University of Georgia, Clifford G. Hildreth, North Carolina State College, W. G. Brown, Iowa State College, Earl R. Swanson, University of Illinois, Donald D. Ibach, USDA, Glenn L. Johnson, Michigan State College, Earl O. Heady, Iowa State College, Travis P. Hignett, Div. Chem. Eng., TVA, R. L. Anderson, North Carolina State College, W. L. Parks, University of Tennessee, John Blackmore, Div. Agric. Relations, TVA, Earl W. Kehrberg, Purdue University.

to better understand the economic analyses that are applicable to fertilizer response data. Although it is desirable to secure data that may give elegant mathematical fertilizer response solutions from a practical standpoint of economists may have to be satisfied with close estimates of the desired data.

Dr. Pesek discussed the technical problems of locating fields on farms that are suitable for adequate soil fertility experimental research. He also indicated procedures that may aid the economist and the agronomists to secure satisfactory fertility experimental locations.

Dr. W. L. Parks, Agronomy Department at the University of Tennessee, discussed methodological problems in research dealing with fertilizer and moisture variables. Dr. Parks indicated that many fertility experiments have been discarded or were never completed because soil moisture deficiency eliminated any chance for the different fertilizer treatments to exert their full potential. In fact, many of the fertilizer experiments conducted today tend to add more information about yearly variation of crop response due to season than they do to defining the actual limits of the fertilizer treatment. Plant nutrition is related in many ways to soil moisture both directly and indirectly. The paper presents some of the factors involved in the mineral nutrition of plants under variable moisture conditions. The factors discussed which are related to the moisture-holding capacity of soil were: (1) texture and clay type, (2) organic matter, (3) osmotic effects, (4) total pore space and pore size distribution, and (5) depth of soil profile.

Ionic relations in a soil system and nutrient absorption under variable moisture conditions were discussed. Other important topics discussed by Dr. Parks were root activity and penetration under variable moisture conditions and experimental designs for combined moisture and fertility experiments.

Dr. Earl Swanson, Professor, Agricultural Economics, University of Illinois, presented a paper titled "Selecting Fertilizer Programs by Activity Analysis." Activity analysis is a newly developed mathematical technique of selecting optimum activity levels. For example, cattle feeding, fertilizer rates, rates of application, or haymaking may be considered as activities. This mathematical technique as applied to farm planning especially with respect to fertilizer use is accomplished by maximizing or minimizing a linear criterion relation, usually some type of profits or costs, subject to such restraints as resource supplies, product requirements, and definitional restrictions that may be appropriate. This type of approach to farm planning assures that there is no better organization possible within the set of restrictions considered. This new technique is superior in relatively complex planning situations where it may be desirable to consider many alternative activities with a large number of restraints on profit maximization. Accordingly, activity analysis is more likely to be useful in selecting a fertilizer program when, for example, outlays for fertilizer must compete with many other enterprises of farm business for a limited amount of capital.

Dr. Earl W. Kehrberg, Professor, Department of Agricultural Economics at Purdue University, presented a paper concerning problems involved in fitting crop production functions to data recorded by soil testing laboratories. Dr. Kehrberg concluded that soil testing laboratory records furnish an adequate supply of data for estimating production functions. Information regarding both plant nutrient levels of the soil and fertilizer applications are recorded along with past cropping history and soil conditions. Certain limitations of the data for production function derivation are also present. Sampling procedures used in obtaining the data are probably among the least serious of these problems. More important is the failure of the soil testing laboratory records to contain measurements of such important variables as plant population, soil nitrogen, and moisture. Further, the possibility of errors of measurement and correlations among independent variables can create statistical problems of production function derivation.

Mr. William G. Brown, Department of Economics, Iowa State College, presented a paper dealing with practical applications of fertilizer response data. He indicated how practical recommendations may be made from highly technical fertilizer response research findings under conditions of varying nutrient cost and product prices. He indicated how simple nomographs can be effectively used in demonstrating practical fertilizer recommendations to groups of farmers.

Dr. Roger C. Woodworth, Department of Agricultural Economics, University of Georgia, presented a paper dealing with ways in which one can organize technical fertilizer input-output data in practical farm planning. He, like Mr. Brown of Iowa State College, developed simple nomographs that may be applied to many specific farm production situations.

Mr. D. B. Ibach, Agricultural Research Service, U.S.D.A., discussed an evaluation of generalized estimates of response to fertilizer using standard yield curves, namely, the Spillman function. Mr. Ibach presented the estimates of fertilizer response using the graphic versus mathematically by fitted curves.

Frank Bell, Professor of Agronomy, University of Tennessee, presented a paper dealing with "Productivity Indices of Soil Mapping Units." In this paper he presented a concept of soil productivity, objectives of soil productivity research past and present methods of estimating soil productivity, and the general economic implications of soil productivity research.

The past quarter of a century has seen a revolution in American agriculture, but the role of chemical fertilizers in this revolution has largely escaped the public notice. The public is generally aware that fewer American farmers are producing more agricultural products. It is also known that since 1930 American farmers have come from the bottom of a depression to levels of income unattained in any other period of our history or by farmers in any other part of the world. It is common knowledge that contributing to these changes have been such factors as mechanization and improvements in crops and livestock. The impact of

(Continued on page 64)

H. Vise Miller who has been named executive vice president of Armour Fertilizer and assistant vice president of the parent Armour and Company.
Mr. Miller joined Armour Fertilizer in 1923.

Wayne A. LeCureux who has joined Federal Chemical Company as assistant sales manager of the Columbus, Ohio division. Mr. LeCureux has had ten years experience in the fertilizer industry and is a graduate of Michigan State University.

Charles W. Shepherd who has been named plant manager of Federal Chemical Company at Columbus, Ohio. Mr. Shephard has been with Federal for several years and is a graduate engineer from Vanderbilt University.
Alvin R. Wagner, not shown, has been appointed assistant plant manager.

General Manager R. R. Hull, Pennsylvania Salt Manufacturing Company's I. P. Thomas Division has announced appointment of George Brown as manager of the Paulsboro (N.J.) plant effective August 1st.

Dr. George Selbie Gordon who is joining the staff of United States Potash Company immediately as Director of Research.
Dr. Gordon presently resides in Princeton, New Jersey; is married and the father of one son and one daughter.

Leslie R. Hamilton who has been named Coordinator of Fertilizer Operations for the Cal-Spray's recently announced 16-million dollar fertilizer plant which is being built in Richmond, California. (See Map).

Gerard J. Carney who has been appointed marketing staff manager of the plant food division of International Minerals & Chemical Corporation, according to an announcement by Maurice H. Lockwood, vice president in charge of the Division.

The Frank G. Hough Co. of Libertyville, Illinois announces the appointment of Robert J. Sudlow as District Representative for the New England States.

Charles E. Hendry, new Fulton Bag & Cotton Mills sales representative for the Kentucky territory. He joined Fulton Bag in 1953 and prior to his present appointment ,has been in charge of Fulton Fabric sales in the Atlanta territory.

Consolidated Chemical Industries, Inc., has announced the promotion of three executives in the Southern Division.
1. Hubert C. Snowden is the general superintendent, replacing J. C. Crowder, who moves to San Francisco headquarters as Vice President and General Manager in charge of West Coast and East Coast Glue operations.
2. O. D. Massey replaces Mr. Snowden as plant manager of the Houston plant.
3. J. A. D. Todd replaces Mr. Massey as plant manager of the Fort Worth plant.

W. D. Van Aken, formerly Kansas-Oklahoma sales representative of Spencer Chemical Company, has been made Mid-West district sales manager.

PERSONALS

Glen J. Noggle, for more than 29 years chemist and factory manager of Miami Fertilizer Company, Dayton, Ohio, has retired, it was announced by President **C. R. Martin.** To succeed him, the company is promoting **Clarence D. Crickmore,** who for 9 years has been assistant factory manager and has supervised, during the past year, the installation and training of men and operation of the new drying and granulating process.

* * *

George S. Linton as manager of its new Humboldt, Iowa, branch and the appointment of **Ronald R. Johnson** as Sales Supervisor at Humboldt, has been announced by **The American Agricultural Chemical Company.**

Mr. Linton has been associated with A.A.C. for the past 18 years. Mr. Johnson joined the A.A.C. in 1950.

* * *

H. E. Graham, Jr., former superintendent at **Blytheville Plant Food Co.,** Blytheville, Ark. is now assistant superintendent at **Weaver Fertilizer Co.,** Norfolk, Va.

* * *

C. B. McCord has been named Plant Manager of **International Paper Company's** three multiwall bag plants, it was announced by **A. A. Scholl,** General Manager, Bagpak Division. Mr. McCord will replace **S. D. Andrew** who retired July 1, after 26 years of service. **T. A. McCord** was named Assistant Plant Manager of the plants at Camden, Ark., Bastrop, La., and Mobile, Ala.

* * *

The appointment of **Elwood I. Lentz** as general manager of **Western Phosphates, Inc.** of Garfield, Utah, was announced July 6 by Hans Stauffer, president. Mr. Lentz, has been vice president and plant manager since the founding of the Company in 1952. Prior to that time he had been associated with **Stauffer Chemical Company.**

* * *

The appointment of **Charles "Chuck" A. Dillon** as district representative for **The Raymond Bag Company** of Middletown, Ohio, has been announced by **H. A. Kennington,** general sales manager. Mr. Dillon will direct sales of Raymond multiwall paper shipping sacks in Texas, Louisiana and Arkansas, with headquarters in Houston.

* * *

E. Reuh & Sons Fertilizer Company have announced that **Leslie E. Little** has elected to retire as director and vice president—production of the corporation, effective on or before October 31, 1955. Mr. Little has served with the corporation thirty years. His successor has not been selected.

* * *

L. B. Horger, assistant manager of **Bemis Bro. Bag Company** plant at Norfolk, Virginia, has retired at the end of 30 years of Bemis service. He plans to devote his time to the operation of his farm in the Piedmont section of Virginia.

Mr. Horger joined Bemis as office manager at Ware Shoals, South Carolina, where Bemis operated a bag factory prior to the purchase of the Norfolk plant. When Norfolk was acquired, Mr. Horger was transferred there and was placed in charge of sales. He was made assistant manager in 1943.

* * *

W. D. "Billy" Barton as general manager of East Point, Cedartown, Gainesville and Attalla operations, and **W. A. Jackson** as sales manager of the same group, have been announced by Tennessee Corporation, East Point, Ga.

* * *

William C. Foster, former deputy Secretary of Defense and president of the Manufacturing Chemists' Association, Inc., became an executive vice president of Olin Mathieson Chemical Corporation effective Aug 1, with headquarters in New York.

* * *

Three vice-presidential appointments at **Battelle Institute,** Columbus, Ohio, were announced July 16 by **Dr. Clyde Williams,** Institute president and director.

Named were **Dr. B. D. Thomas, David C. Minton, Jr.,** and **John S. Crout.** All three have long been associate directors of the research organization, and, along with Dr. Williams, comprise the key policymaking and executive team in Battelle management.

* * *

Wade W. Hildinger, general sales manager of **National Gypsum Company,** Buffalo, N. Y., has been named director of general sales, and **Melvin F. Cerruti,** formerly eastern division sales manager, has been appointed **general sales manager,** it was announced today by **Melvin H. Baker,** chairman of the board.

* * *

Dr. Mary Franklin, of the nematology department, Rothamsted Experimental Station, Harpenden, Herts, England, is working with the plant pathology staff of The Connecticut Agricultural Experiment Station, according to Dr. James G. Horsfall, director, on a 3-month appointment.

* * *

Dr. Donald F. Jones, who invented the double-cross method of hybrid seed-corn production, will be honored at the annual Field Day to be held at **The Connecticut A.E.S.** experimental farm, Mt. Carmel, August 16. Dr. Jones is head of the Genetics Department at the Station.

* * *

Harry C. Lawless, Vice-President and Director of Sales, Gilman Paper Co., New York, announced that **F. L. Munger,** formerly Asst. to the VP in charge of sales, has been promoted to Vice-President and Sales Manager of the **Kraft Bag Corporation,**

Paul L. Weller, manager of market research for Spencer Chemical Company since November 1953 has been named assistant to Joe E. Culpepper, vice-president in charge of sales.

Edward "Ted" Tolin, manager of the new New York office of Atkins, Kroll & Co., San Francisco. Address, 500 Fifth Avenue.

THE PROBLEM OF WATER FOR THE FUTURE

Not so long ago, the Valley National Bank of Phoenix Arizona felt impelled to protest that people were mistaken about Arizona not having any water. Of course, they admitted, it was a serious matter and of deep concern to the Arizona farmer and cattleman, but unless the Easterner who is thinking of moving to Arizona is planning to make his living from the soil, they said, he need have no fear of water shortage.

But our readers do make their living from the soil—and many of them would be very much interested in the future possibilities of making some, at least, of that living from Arizona soil. So the Valley National Bank's analysis of the agricultural water situation is interesting, and is presented here in full:

"To the average Arizona farmer, the water situation is a matter of deep concern. If he relies on wells, he is troubled by the falling level of his underground supply. The lower that level, the higher his costs of pumping water. If he uses gravity flow water, his problem is not so acute—but he realizes that a continued cycle of drouth years will endanger, or least lessen, that source of supply. If he is a cattleman with thousands of acres of waterless range, he turns to the government for relief when the skies fail to bring forth rain.

"Modern science, it seems, is even more keenly aware of the problem than the average Arizona farmer. **Many of the latter fail to realize that water is a natural resource comparable to copper or oil.** When a company plans to process copper for example, it makes every effort to calculate as carefully as possible the quantity and quality of the underground body, the depletion point, and the costs of bringing it to the surface —then bases its investment and amortization on these findings. When it comes to "mining" water, however, many Arizona agriculturists have been guilty of both wastefulness and inefficient planning. **Any intelligent long-range program of agricultural area development should regard water in much the same light that mining companies regard an underground mineral deposit.**

"Realizing this, modern science has been thinking in terms of conserving, replenishing and even "creating" water for such arid areas as Arizona. Its experiments have covered a wide horizon—from here to the sun, it might be said, inasmuch as serious consideration is being given to the possibility of harnessing solar energy to distill sea water and pump it onto the desert.

"Conservation-wise, the proposed solutions (or partial solutions) are hardly as dramatic. A Johns Hopkins scientist, for example, is working on a system that measures the moisture that heat and sunlight blot up from plants. Such measurement tables, he believes, can enable farmers to work out accurate irrigation schedules to avoid using more water than is needed.

"Other conservation-minded scientists have proposed seeding rangelands and non-irrigated areas with grasses that will resist erosion and require but little water—thus permitting greater "underground replenishment" from seasonal precipitation. **Still others have recommended construction of underground dikes in known water-bearing valleys to control sub-surface water and thus eliminate evaporation loss attending exposed reservoirs.**

"Cloud-seeding, of course, is one of the widely discussed methods of "creating" additional water supply. "However, the rainmakers to date have brought down more controversy than they have rainfall," admits Dr. Edward G. Bowen, an Australian radiophysicist who cooperated in University of Arizona experiments in Tucson last year. **Why does it rain hardest at certain times of the year?** Dr. Bowen believes it may be caused by fall-out of meteor dust from outer space. If his theory works out, he told the recent International Arid Lands Symposium at Albuquerque, "the most effective seeding operations might be those designed to influence the weather on a hemisphere-wise basis, rather than operations intended to cover a few square miles only."

"So far, it's too costly to desalt sea water by solar stills which harness the sun's rays, another scientist told this same gathering last month. Inexpensive power is needed and a possible answer may be nuclear reactors, he observed. From another source, this publication learned that costs of distilling sea water by means of solar energy "stills" are running close to $1000 an acre-foot, a sum which even the most enthused solar energy partisan would admit is exorbiant.

"Nevertheless, conversion of salt water into water suitable for domestic and agricultural use is felt by many scientists to be the most practical answer to the water shortage problem. The administration apparently is of the same mind because this month the House passed and sent to the Senate a bill to continue and expand the government's program of research in salt water conversion. Originally launched in 1952 with a $2 million appropriation, it would be extended to 1963 and the appropriation increased to $6 million.

"The Interior Department, under whose auspices the research program is being conducted, frankly hopes to be able to convert salt water for use in irrigation at costs not to exceed $40 per acre-foot. A small-scale pilot project has been underway for the past several months at Buckeye. There, salt water is being field-tested with a portable plant operated by Ionics, Inc., a Massachusetts research firm under contract to the Interior Department. By means of a permeable membrane, the high salt content of water taken from a Buckeye Irrigation Co. well is reduced enough to make the water useful for additional crops—or even to make it potable as drinking water.

"An internationally-known hydrologist, now living quitely in Arizona, was asked by your editors to comment on the Buckeye experiments. "At the moment, it seems one of the most promising of all solutions to the water shortage problem," he declared. "It seems almost certain that water can be desalted for domestic (municipal) use at a non-prohibitive cost within the very near future. But when it comes to desalination for search and lower costs are necessary. More large-scale experiments and coordination of resulting findings with those being made by European scientists working along the same lines might well turn up a method sufficiently economical to meet agriculture's needs here in Arozonia and other arid areas. **As a matter of fact," he continued, "if water can be desalted at a cost, say, of $20 an acre, it might be economically feasible for Arizona's large-scale, high yield cotton farmers—although currently such a cost would be prohibitive for marginal farmers."**

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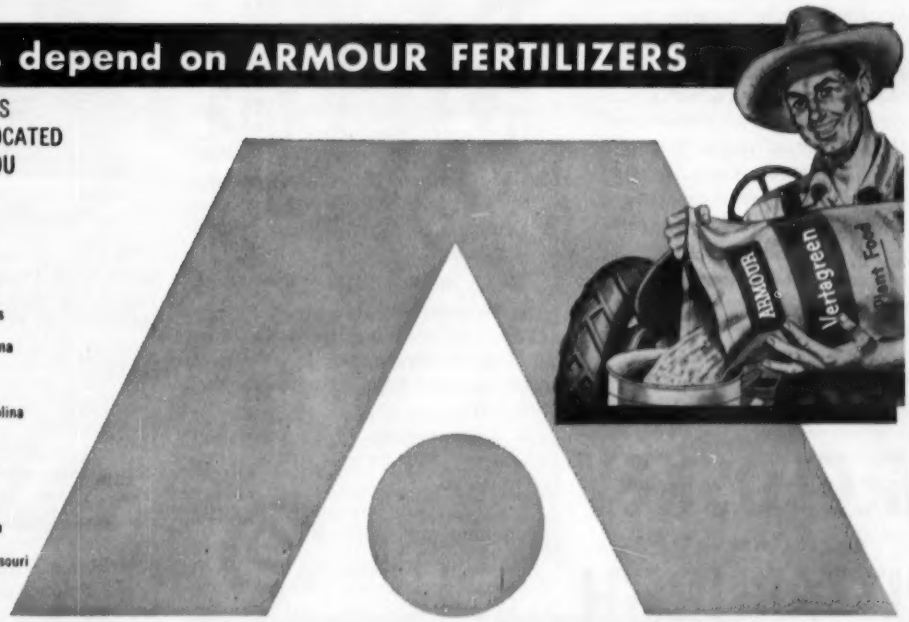

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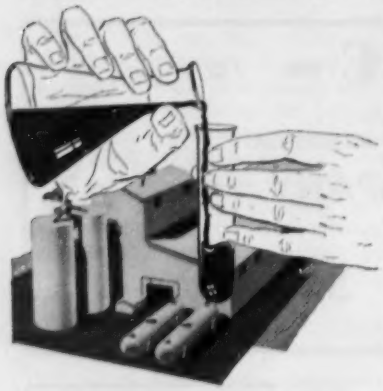

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"Perhaps some of this thinking is what Senator Goldwater had in mind when he told a Phoenix Press Club forum audience last week: "We are very close to the point where we can make sea water fit for domestic use at approximately the same cost as present supplies. **I believe I'll live to see the day when we'll pipe water around the West like we do oil and gas now."** The Phoenix daily press, in commenting editorially upon the Senator's remarks, referred to the Buckeye field tests and, like us, to the fact that science is exploring several other avenues of water supply for arid regions. Then it added: **"The state's fight to obtain a fair share of Colorado River water is nearing a Supreme Court showdown at last. All in all, Arizona's water hopes are higher than they were a few years ago, despite the current drouth."**

"To this we can only add a fervent "Amen," a note to Life and Readers Digest to please copy these observations, and a hope that our Eastern friends will water down their misconceptions about Arizona's water potential. With our readers, we leave this question that just occurred to us: 'In view of Arizona's remarkable progress as an arid state,what will its progress be when sufficient water is available for every conceivable use—domestic, industrial and agricultural'?"

OLIN MATHIESON BEGINS AN IRRIGATION RESEARCH PROGRAM

Reflecting the rapidly growing use of supplementary irrigation as a means of increasing crop yields and farm profits, Olin Mathieson Chemical Corporation is initiating a program of research on the agronomic and technical aspects of irrigation, Sam L. Nevins, vice president of the company's Western Fertilizer Division, has announced.

Supervised by the company's irrigation department, of which Thomas W. Crockett is manager, the program will be directed by Dr. G. G. Williams, Purdue University agronomist, who joins the company August 1 as manager of irrigation research and planning.

The program has three objectives:

1. To determine the effect of irrigation in combination with high analysis water soluble fertilizers to promote maximum yields on various soil types.

2. To determine which crops and which soils can be most economically irrigated.

3. To develop improved irrigation equipment and methods.

While the program is expected to develop considerable data of benefit to farmers, it also will serve to guide the development of Olin Mathieson's irrigation engineering and marketing programs.

Dr. Williams since 1950 has been a full time staff member of Purdue University, engaged in research on soil moisture and plant growth relationships and in practical irrigation research on pastures, hay crops and corn. He received his Ph. D. degree from Purdue in January, 1954, his thesis being, "The Effect of Soil Moisture on Plant Growth and Phosphorus Uptake." He is one of the authors of "Irrigation Guide for Indiana" and other publications in this field.

Dr. Williams

Born in Victoria, Texas, Dr. Williams was raised on farms near Goliad, Texas. He is a graduate of George Pepperdine College, Los Angeles. After Naval Service during World War II, he received a Bachelor of Science degree in general agriculture and a Master of Science in agronomy from the University of California.

On the basis of experiments started in 1943, the Mathieson system of supplemental irrigation was introduced in Eastern markets at the end of World War II. The company today is a major marketer of supplemental irrigation equipment.

Hudson Acquires Hammond Bag & Paper

The acquisition of the multiwall bag manufacturing business of Hammond Bag & Paper Company of Wellsburg, West Virginia by Hudson Pulp & Paper Corp. of New York City, in exchange for shares of Class A common stock of Hudson was officially announced by William Mazer, of Hudson.

Hammond will operate as a separate division with the same executive sales and employee personnel and sales operations and services will as heretofore be conducted under the Hammond name. Customers of Hammond will, however, have the advantages which Hudson possesses.

Hudson Plant Installs Nuclear Scanning Device

The installation of a nuclear scanning device at Hudson Pulp & Paper Corp.'s Palatka, Florida mill was announced by R. S. Hatch, vice president, Research and Development. The scanner will continuously observe and regulate the quality of every foot of the company's kraft paper.

"The nuclear device," Mr. Hatch said, "is the largest ever installed in a kraft paper mill, and will insure the production of paper with a uniformity of basis weight never before possible, even with the most skilled paper-making personnel."

Sweeping back and forth across the paper-making machine, the nuclear scanner's beta rays measure the precise basis weight of the paper and an electronic integrator automatically regulates and controls the flow of pulp fed into the machine.

It is expected that the nuclear scanner will regulate the basis weight to a variance of less than 2%, as compared with the commercially acceptable 5%.

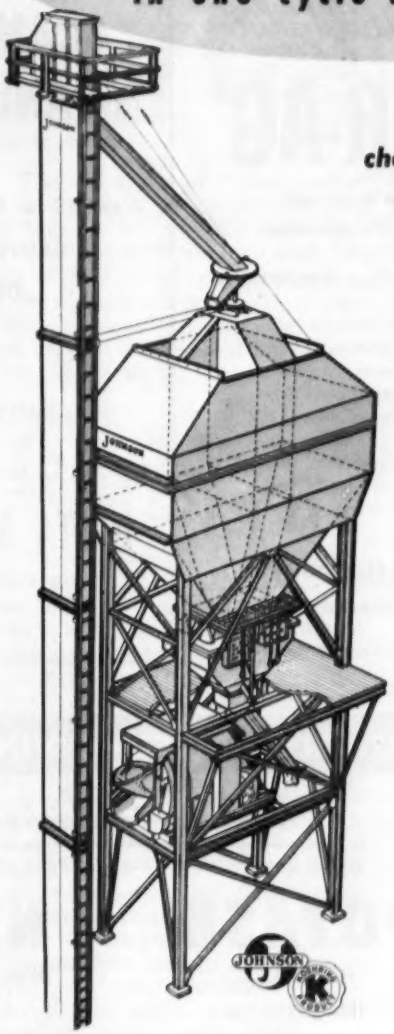
Mr. Hatch termed the use of radioactive isotopes to safeguard quality a real scientific advance for the paper industry. Greater uniformity, he pointed out, means stronger paper, more resistant to stresses and tearing.

OBITUARIES

W. Frank Kerr, Fulton Bag representative in Mississippi and Arkansas, died suddenly June 30 at Memphis, Tenn. He had been with Fulton Bag since 1946.

Joseph H. Rockett, 47, assistant sales manager of Sinclair Chemicals, died suddenly in New York on June 29. He had been with Sinclair since 1927.

Batches, blends materials in one cycle of operation



check how this Johnson plant can be adapted to suit your requirements

- Arranged for manual or full automatic control, this Johnson fertilizer blending plant mechanizes all material-handling operations.
- It pulverizes, screens, batches, and blends materials in one continuous-flow operation.
- Enclosed bucket elevator feeds materials to top of the plant at a rate of 1,000 cu. ft. per hour.
- Clod breaker, with short belt conveyor, vibrating screen and collecting hopper can be installed between elevator head-section and overhead storage bin.
- Reject pipes can be added to automatically return oversize materials from the separating screen to elevator for re-sizing.
- Pivoted distributor directs flow of screened material from collecting hopper into storage bin.
- Johnson 100 to 200 cu. yd. Portable Section Bin, shown here, accommodates five materials — has four sections arranged around a central compartment.
- Bin feeds materials into a Johnson multiple-material weigh batcher, equipped with a 5,000-pound dial-head scale. Batcher accurately weighs up to five (or more) fine-grained materials.
- Solution weigh-batcher can be installed on the batcher platform.
- Mixer, for final blending operation can be installed on elevated platform, as shown, or at floor level to reduce plant height.

Owned and operated by leading fertilizer manufacturers, Johnson blending plants offer you a low-cost way to batch and blend materials to exact specifications. Whether you are interested in complete installations, or want to modernize existing facilities, check with us. All types, sizes of plants and auxiliary equipment available. Write today.

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☐ Send us more data on Johnson fertilizer blending plants. ☐ Have Johnson distributor call.

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the sterilized organic conditioner

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A REPORT ON FERTILIZERS IN *India*

So much has happened agriculturally in India, and the development of fertilizer usage in that country has been so spectacular that this report, presented at the National Plant Food Institute convention, is of special interest —we believe—to our readers. Mr. Rahimtula is with Hyderabad Chemical Fertilizers, Ltd. Secunderabad, India, and represented the newly formed Fertilizer Association of India at the Institute convention.

By A. A. RAHIMTULA

India, as you know, is predominently an agricultural country where 70% of its people are engaged in agriculture. 77.6% of the cultivated land in India is under food grains while oilseeds occupy 5.17%, Cotton 3.9%, Sugar Cane 1.3%, Jute 0.3% and the other crops 8.8%.

India has a population of nearly 360 million people to feed. To this every year ½ million more are added. The yield of principal crops in India is palpably low. For instance, the average yield of rice is 690 lbs. per acre, wheat 580 lbs. per acre, cotton 80 lbs. per acre and sugar cane 13 tons per acre. The main reason for the low yield is not very far to seek. The land, from time immemorial, is subjected to cultivation and has, therefore, got depleted to a very great extent from its reserves of both Nitrogen and Phosphates.

At the beginning of the Second World War, India faced, among other things, acute food stortages and had then realized the urgent need to become self-sufficient in the matter of food grains.

Two major decisions, therefore, were taken; one was to harness the rivers of India for irrigation and other was to build up the industry to produce Nitrogenous Fertilizers in the country.

Both these schemes were launched simultaneously and today we are, if I may so say, rightly proud of having the biggest nitrogenous unit producing Ammonia Sulphate, Urea and Double Salts in the East.

On the other side, India has built up, in the course of its First Five Year Plan, River Valley Projects, such as Domadar Valley, Bhakra-Nangal, Tungabhadra, Nandikonda and Hirakud to increase the production of food grains and other crops as under:

	1950-51	1955-1956
Food Grains (million tons)	52.7	61.6
Cotton (lakh bales)	29.7	42 2
Jute (lakh bales)	33.0	53.9
Sugar Cane (million tons)	5.6	6.3
Oil seeds (million tons)	5.1	5.5

These River Valley Projects in the very foreseeable future are bound to change the face of India and create wealth for its people and food for its teeming millions.

As a result of this plan, there will be more acreage under cultivation at the end of the First Five Year Plan as follows:

(Area in Million acres)

	1950-1951	1955-1956
Rice	76.0	80.0
Wheat	24.0	27.0
Other cereals	93.0	90.0

There is a stir of new life in India. We are emerging from a peasant economy to well planned modern agricultural practices, which imply, first and foremost, the use of Chemical Fertilizers without which the depleted soils refuse to yield adequate crops.

There is a silent revolution coming on in the country. Community Projects, National Extension Blocks, The River Valley Projects, all these efforts, to which the people have today dedicated themselves, is creating a new and better India. Nevertheless, it is to be admitted that old practices die hard. Conservatism is still there. The ordinary farmer in India is both poor and ignorant, and, therefore, would not easily take up to the modern agricultural practices and use chemical fertilizers on the same scale as the progressive countries usually do. Use of Chemical Fertilizers in India is, as compared to other countries dismally low. The following figures will illustrate the fact:

	In 1000 Metric Tons		
	1938	1948-49	1953-54
Total consumption of Nitrogen	16.0	53.3	80.6
Total consumption of Phosphates	1.7	9.0	16.6
Total consumption of Potash	-	2.0	5.6
Average per 1000 hectares of arable land	0.61	0.13	0.14

The consumption of fertilizers as against requirements, is very inadequate. The problem, therefore, before us is to step up consumption of Chemical Fertilizers. So far as nitrogenous fertilizer is concerned farmers have come to gradually appreciate the benefits accuring from its usage.

Unfortunately, this is not so with regard to the usage of Phosphates and Potash. So far as potash is concerned, soil research in most parts of India has established that the deficiency of potash in the soil is not marked. Nevertheless, there is an awareness that in coming years the reserves will be exhausted and addition of potash will become a necessity.

Having realized this situation, demonstrations are being conducted all over the country to find out the requirement of potash with reference to major crops, such as Rice, Sugar Cane, Tobacco, Cotton, Citrus, Coconut, Tea and Coffee.

Already the Indian Fertilizer Industry in collaboration with French and German Potash interests has launched a well organized scheme of research to find out the requirements of potash on different crops.

Research has established that nitrogen alone is not a complete plant food, unless it is supplemented with phosphate. The importance of phosphate has now been fully admitted. The ratio of the two viz. nitrogen and phosphate, has yet to be established and there is a great deal of field work to be done to convince the farmer regarding the benefits of phosphate and the importance of its usage.

The requirement of P_2O_5 in India is over one million tons whereas the consumption is only 15,000 tons. To fill this gap is our problem. We have in India 15 Superphosphate producing units with a total installed capacity of 50,000 tons a year, but the production is only about 20,000 tons.

India in its next Five Year plan has fixed the target of consumption of P_2O_5 at 1.20.000 tons as under:

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Nitrogenous Materials

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Urea, 45½% and 46% Nitrogen

Calcium Ammonium Nitrate, 20.5% Nitrogen

Representatives

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Bags—Paper and Textile

Ammoniated Base and Superphosphate

Dolomitic Lime
(42-44% Magnesium Carbonate)
(54/56% Calcium Carbonate)

POTASH

PEOPLES OFFICE BUILDING

Charleston, South Carolina

Phones: 3-4828 and 3-4829

Year	Tons of P_2O_5
1957	40,000
1958	50,000
1959	70,000
1960	90,000
1961	120,000

Since we have fixed the target of consumption of P_2O_5 at 1.20.000 tons for the next 5 years, it is, in my opinion, a matter of supreme importance to make India phosphate minded. The newly formed Fertilizer Association of India wants to take a lead in this direction and, would therefore, welcome active co-operation of the International Superphosphate Manufacturers' Association towards fulfilment of its object of stepping up the Consumption of Phosphate in India in coming years.

Omega Issues Revise Of Melnychuk Paper

Omega Machine Co., division of B-I-F Industries, Inc., has reprinted a revised edition of an article by Andrew A. Melnychuk on "Continuous Proportioning Equipment for the Fertilizer Industry."

Four new flow diagrams show the applications of Omega liquid and dry material chemical feeders in recently developed continuous processes. Technical data and installation photos are also contained in this 12-page bulletin.

For your free copy of Ref. No. 10-H22A write Omega Machine Co., 345 Harris Ave., Providence, R. I.

Great Plains Program Launched At Meeting

Members of Secretary Ezra Taft Benson's immediate staff and representatives of USDA agencies met with the Great Plains Agricultural Council in Laramie, Wyo., July 25-27, to work with state agricultural leaders in putting finishing touches on a long-range program aimed at stabilizing agriculture in the Great Plains. The Great Plains Council includes representatives from 10 states.

First proposals for such a program were developed in early June in a meeting at Denver, Colo., between Federal and State representatives and governors of the Plain States.

Since the Denver meeting, the proposals presented have been reviewed by many key farm groups and individuals. Among these were leaders from the National Association of Soil Conservation Districts, the American Farm Bureau Federation, the National Grange, the National Council of Farmer Cooperatives, and private and cooperative lending agencies.

CHANGE TEST PLOTS AFTER 79 YEARS

The oldest experimental agricultural plots in the nation are undergoing their first changes in 79 years of research.

The land is part of 10 experimental plots set up in 1876 by George Morrow, U. of I. agricultural professor, to settle the controversy then raging about whether or not prairie soils could be depleted.

Of the 10 plots Morrow laid out in 1876, only three remain today. One is in continuous corn; one is a corn-oats rotation system; the third is a corn-oats-clover rotation plan.

Experimentation by 1904 had proved any soil can be depleted from constant use but by simply changing the crops the depletion process takes longer.

Then began a study of how to maintain productivity or increase it.

Researchers divided the three plots in half, creating six sections and continuing constant corn crops on the north half. The south half was treated with phosphate, limestone and manure as needed.

Part of the land now is growing its 80th consecutive corn crop.

A strip cutting across all six sections this spring was fertilized with five tons per acre of lime, 200 pounds of nitrogen, 500 pounds of 20 per cent superphosphate and 200 pounds of 50 per cent muriate of potash.

U. of I. researchers want to find out how long it will take to rebuild the fertility of the depleted soil.

The fertilized strip covers about one-fourth of each plot. Where the strip crosses the north half of the three original plots it will be the first soil treatment since they were laid out in 1876.

The continuous corn crop record, however, will be maintained on other sections of the three original plots, as will the two rotations without fertilizer.

The Morrow plots have been called "the most valuable piece of ground in America."

But when Morrow laid out the plots in 1876, one farm writer said, "it is most unlikely that they can ever be of any value to any farming lands in any of the Western states, particularly good corn land."

DRYERS AMMONIATORS* GRANULATORS* ELEVATORS COOLERS CONVEYORS for the Fertilizer Industry

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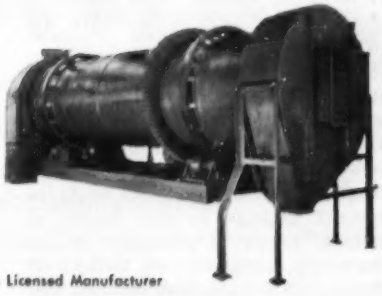

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Highly efficient shelf design for quick thermal release, with special feed and discharge breechings. Rotary seals prevent air losses.

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Literature and information on request.

CF Staff–Compiled TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by COMMERCIAL FERTILIZER Staff

	Apr.-May-June Quarter		June		May		April	Jan.-Feb.-Mar. Quarter		July thru December		Year (July-June)	
State	1955	1954	1955	1954	1955	1954	1955	1955	1954	1954	1953	1954-55	1953-54
Alabama	413,723	427,718	50,362	46,738	112,559	89,558	244,382	433,542	498,391	267,041	147,702	1,114,238	1,074,892
Arkansas	136,306	147,461	21,126	28,420	42,602	30,062	72,578	134,588	166,326	59,887	52,438	330,776	366,225
Georgia	718,919	761,343	115,109	102,253	226,707	262,764	377,103	328,956	385,809	225,083	218,027	1,273,445	1,361,254
Louisiana	108,810	110,234	20,215	21,290	33,281	25,253	55,314	123,971	140,513	78,067	74,471	310,848	325,218
Missouri	205,628	226,893	18,720	15,185	84,582	91,951	102,326	189,351	273,137	268,257	256,427	663,166	756,457
N. Carolina	.....	694,799	72,644	72,232	216,217	168,097	451,785	825,492	863,673	264,475	257,100	1,830,633	1,815,572
Oklahoma	28,029	31,627	5,028	5,701	9,088	11,777	13,913	35,770	41,182	58,406	71,558	122,305	144,367
S. Carolina	269,475	160,908	37,991	12,845	75,096	40,880	156,388	521,731	591,731	132,604	183,919	928,715	936,558
Tennessee	218,999	322,123	25,862	65,414	104,721	160,585	88,416	63,463	83,633	167,383	107,544	523,349	523,300
Texas	156,592	168,687	32,269	34,714	60,376	61,080	63,947	214,995	205,622	212,885	186,097	584,269	560,381
California	.....	299,195[1]	(reports submitted quarterly)					283,155	214,105	318,270	317,270	.....	830,327[1]
Virginia	.....	314,945[1]	(reports submitted quarterly)					287,367	305,316	159,185	160,715	.....	780,931[1]
Indiana			(reports submitted semi-annually)							285,673	283,987	.....	1,180,091[1]
Kentucky			(reports submitted semi-annually)							91,386	88,905	.....	577,905[1]
New Jersey			(reports submitted semi-annually)							53,830	57,928	.....	289,614[1]
Washington			(reports submitted semi-annually)							58,162[1]	*	.....	*
TOTAL	2,997,147	3,051,798	399,326	404,792	965,229	942,007	1,626,152	3,442,381	3,769,438	2,642,432	2,464,088	7,681,744	7,864,224

..... (not yet reported) * Not compiled [1] Omitted from column total to allow comparison.

MARKETS

ORGANICS: Producers of fertilizer organics continue in heavily sold positions for the fall and spring. Leather Nitrogenous Tankage contracts for the new season, depending on the producer, have been made at prices varying from $4.10 to $5.00 per unit of Ammonia bulk, f.o.b. production point.

CASTOR POMACE: Very little activity in this material as practically no supplies are available for sale. Price is nominally $37.50 per ton, in bags f.o.b. New Jersey production points and movement is against previous contract commitments.

DRIED BLOOD: This market has strengthened up recently due to feed support and is currently indicated at $5.75 to $6.00 per unit of Ammonia in bags for unground material in the Chicago Area. The New York market is approximately the same.

POTASH: Rather little activity is noted and is not expected until mixers begin preparations for the fall season. No change in prices has been noted.

GROUND COTTON BUR ASH: Increased interest in this source of Potash, which is primarily in the form of Carbonate of Potash, is noted and supply and demand appear to be in good balance. Current analyses vary from 38% to 42% K_2O enabling the material to deliver at approximately the cost of Domestic Sulphate of Potash.

PHOSPHATE ROCK: The Phosphate Rock strike in Florida continues and previous heavy inventories of Superphosphate have been steadily reduced. The strike has been in effect since June 1st at most of the Florida producers' mines.

SUPERPHOSPHATE: No heavy pressure as yet has developed on supply position but if the Phosphate Rock mines continue struck for an extended period, supplies will be considerably reduced.

AMMONIUM NITRATE: The market is relatively quiet and supplies are accumulating in storage for fall use. It is reported 30 to 40,000 tons will be offered for export to Korea. Prices remain steady in general.

NITRATE OF SODA: Movement of this form of Nitrogen is in seasonal dimensions and prices remain unchanged.

GENERAL: Movement of mixed fertilizers at this time of year are at a low ebb and fertilizer manufacturers are primarily interested in contracting for materials for fall use. Most raw materials appear to be in adequate supply with no serious shortages expected unless possibly there is undue prolongation of the Florida Phosphate strike.

Jeffrey Opens New N. C. Office

The Jeffrey Manufacturing Co., Columbus 16, Ohio announces the opening of a new district office in Raleigh, North Carolina, under the management of J. R. Brisley. Located at 116 South Harrington St., the office will promote and sell products of Jeffrey's Conveyor Division in North Carolina and a part of Virginia, according to Lincoln Kilbourne, division sales manager.

Jeffery Consolidates "What We Make" Data

In a new pocket-size booklet, Jeffrey Manufacturing Co., Columbus 16, Ohio, has consolidated the basic data of their many products. Booklet 777 is an up-dating of their former "What We Make," and is available to all who request it. Individual catalogs are, of course, still available.

Model HO, the third, and largest, of the completely new four-wheel-drive tractor-shovels to be added to the "PAYLOADER" line has just been announced by the manufacturer, The Frank G. Hough Co., Libertyville, Illinois. This newest unit has a capacity of two cubic yards.

Full details and specifications may be obtained from The Frank G. Hough Co., 702 Seventh Street, Libertyville, Illinois.

Safety FALL MEETING
FERTILIZER SECTION

MONDAY AFTERNOON

October 17, La Salle Hotel
Nineteenth Floor, Century Room

2:00—**Report of the General Chairman.** Thomas J. Clarke, Controller, G. L. F. Soil Building Service, Terrace Hill, Ithaca, N. Y.

2:20—**Report of the Nominating Committee and Election of 1955-56 Officers.** Vernon S. Gornto, Manager Insurance Department, Smith-Douglass Company, Norfolk, Va.

2:30—**Safety and Human Relations.** Max W. Foresman, Director of Public and Plant Relations, Spencer Chemical Company, Kansas City, Mo.

3:00—**Selling Safety or Management and Supervision's Part in Loss Prevention (Illustrated)** P. W. Logan, Division Manager, Loss Prevention Department, Liberty Mutual Insurance Company, Atlanta, Ga.

3:45—**Report on Motivation Study.** Dr. Charles W. Nelson, University of Chicago.

4:15—**Views and Interviews.** Leader: Curtis A. Cox, Assistant Manager Manufacturing Department, Virginia-Carolina Chemical Corporation, Richmond, Va.

TUESDAY LUNCHEON AND AFTERNOON

Presiding: General Chairman Elect.

12:00—**Luncheon.**

12:45—**Remarks by the General Chairman Elect.**

1:00—**Address: Is Safety First?** B. J. Phillips, Safety Director, Coronet Phosphate Company, Division of Smith-Douglass Company, Plant City, Fla.

2:00—**Safety "Musts" (A Panel Discussion).** Discussion Leader: Curtis A. Cox, Assistant Manager Manufacturing Department, Virginia-Carolina Chemical Corporation, Richmond, Va.

(a) **Mechanical Guards (Display).** Duncan MacDonald, Safety Engineer, Anaconda Copper Mining Company, Anaconda, Montana.

(b) **Conveying Devices.** R. G. Diserens, Safety Director, Phillips Chemical Company, Bartlesville, Okla.

(c) **Fire Protection.** Fred H. Courtenay, Secretary, Federal Chemical Company, Louisville, Ky.

(d) **Liquid Nitrogen.** C. L. McDaniel, Technical Service Supervisor, Chemical Sales Division, Lion Oil Company, El Dorado, Ark.

(e) **Fertilizer-Insecticide Mixing Problems.** Robert P. Henry, Agricultural Department, Willson Products, Incorporated, Reading, Pa.

(f) **Safety Rules.** Albert A. Waugh, Safety Supervisor, International Minerals and Chemical Corporation, Bartow, Fla.

(g) **Electrical Hazards.** D. Lydy, Safety Engineer, Goodrich-Gulf Chemicals, Inc., Port Neches, Texas.

3:45—**Question and Answer Period.** (Panel Members Participating)

NAC TO FEATURE RESEARCH AND ECONOMICS SEPT 7-9

The effects of research and economics on the future of the pesticide industry will be highlighted at the 22nd Annual Meeting of the National Agricultural Chemicals Association at Spring Lake, New Jersey, September 7, 8, and 9, L. S. Hitchner, Executive Secretary of the Association, announced.

"Never before have research and economics been more important to the pesticide industry and to the entire field of agriculture," Mr. Hitchner declared. "Pesticides already are making a major contribution toward reducing labor costs on the farm and toward aiding the food industry in various processes involved in delivering high quality foods to consumers at prices they can pay. Through discovering new uses for materials now available and through development of new products, research can greatly increase the contributions the industry will be able to make to agriculture and to the general welfare.

"Economics, too, are of great concern to everyone in agriculture. As the result of rising incomes, Americans are eating more food each year, and each year there are more Americans. Some estimates indicate that the market for food products might increase as much as 25 per cent in the next five years. We must all be ready with the most advanced technology to help produce greater volume of quality foods as the demand for them develops," Mr. Hitchner said.

The program for the 22nd Annual Meeting of the Association lists speakers who will cover all pertinent phases in both of these important fields. Speakers include: Warren Moyer, President of the Chipman Chemical Company; H. E. Luedicke, Editor of the Journal of Commerce; A. W. Mohr, President of California Spray - Chemical Corporation; Dr. John T. Thurston, Director of the Stamford Research Laboratories, American Cyanamid Company; Professor G. E. Lehker, Professor of Entomology, Purdue University; Dr. S. W. Simmons, Chief of Technology Branch, U. S. Public Health Service, Atlanta, Georgia; and James D. Hopkins, President, Hopkins Agricultural Chemical Company.

One of the highlights of the Annual Meeting will be a panel discussion on the latest developments relating to the Miller Amendment, which regulates the use of pesticides on food crops. The amendment, now Public Law No. 518, is designed to strengthen the Federal Food, Drug and Cosmetic Act, which requires food shipped in interstate commerce to be pure and wholesome.

Panel members will be Winton B. Rankin, Assistant to the Commissioner, U. S. Food and Drug Administration, Dr. W. G. Reed, Head, Pesticide Regulations Section, Plant Pest Control Branch, U. S. Department of Agriculture, and Dr. Charles W. Palm, Head, Department of Entomology, New York State College of Agriculture at Cornell University.

Pennsalt Moves Executive Offices

The executive offices of Pennsylvania Salt Manufacturing Company and the headquarters of its operating divisions have been moved to Three Penn Center Plaza, Philadelphia. The phone remains unchanged at Locust 4-4700.

Pac. NW

(Continued from page 41)

Pounds of Solid Materials dispersed by air	587,505,094
Acres treated with Solid Materials	24,175,397
Hours flown dispersing Solid Materials	412,699

Included in the foregoing was:

Pounds of Fertilizer dispersed by air	218,192,333
Acres Fertilizer by air	2,127,457
Hours flown Fertilizing	56,703

In addition to the foregoing, 35,654,711 gallons of spray were flown on 12,919,629 acres.

Harry A. Kittams and **W. P. Mortensen,** Western Washington Experiment Station, Pyallup, Washington, reported on Leaf Sampling Techniques For Various Western Washington Crops.

Foliar analysis techniques have been developed by personnel of the Soils Department, Western Washington Experiment Station, for determining the nutrient status of various crops grown under western Washington conditions. Sampling techniques and critical nutrient levels have been quite definitely established for peas and potatoes. Studies are presently under way with the objectives of developing sampling techniques and ascertaining critical nutrient levels for strawberries and red raspberries.

Experiments have shown that the best time for foliar sampling of peas is between the six- to nine-node stage of growth. The nutrient status of phosphorus and particularly potassium is best reflected in the leaf blades selected from the third node from the top of the plant. Less than 2000 p.p.m. of PO_4-P in the leaf tissue is considered low and a response to phosphorus fertilization would be expected. When the total K content of the leaves is less than 1.3 per cent a response to an application of potash is highly probable. The optimum time for sampling potatoes is during the six- to eight-inch stage of growth. This corresponds to a period of 35 to 45 days from the date of planting. Generally the leaf blades of the fourth or fifth leaf from the top of the plant best reflect the nutrient status of the potato plant. Less than 4000 p.p.m. of PO_4-P is low and responses to phosphorus fertilization are likely. Potash responses are probable when leaf potassium content is less than 4.5 per cent total K.

Only preliminary work has been completed for strawberries and raspberries. Indications are that leaves selected from the fourth or fifth node down from the top of the nonbearing canes are most desirable. The leaf petioles are most sensitive to potassium whereas the leaf blades are most sensitive for nitrogen and phosphorus. Sampling should be between June 15 and July 15. The youngest mature leaves of strawberries collected between June 1 and 15 seem to be most indicative of the nutrient status of the strawberry plant. The blade of the leaf is more sensitive to changes in the nitrogen and phosphorus levels, while the petiole is the more sensitive for potassium. Critical levels of these essential elements have not been ascertained so far for either strawberries or raspberries.

Symposium

(Continued from page 51)

the tractor and hybrid corn are well known, but few are aware of the phenomenal increases in fertilizer use that have been associated with the increases in production and income of the past 15 years. Since 1934 fertilizer consumption has risen in this country from 7 million to 23 million tons. In the great agricultural areas of the Middle West the increase in fertilizer use has been particularly striking—being 40-fold in Illinois and nearly 100-fold in Iowa. In Tennessee where fertilizers have been heavily used for many years, the increase in the past 15 years has been 4-fold.

Another striking change in fertilizer use has been the rapid rise in average analysis. In 35 years, from 1900 to 1934, the plant food content of American fertilizers rose 4 units or 30 percent. In the 19-year period of 1934 to 1954 it has shot up nearly 8 units or twice as much in half the time.

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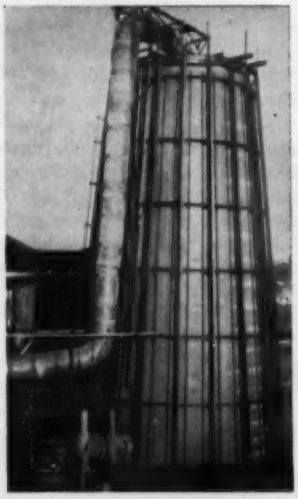

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U. S. Potash To Expand Operations

Directors of the United States Potash Company have approved the expenditure of approximately $3,000,000 to increase the output of its mine near Carlsbad, New Mexico and to expand its refining facilities to provide about 20% additional productive capacity.

The free-flowing, high-analysis muriate of potash which the company produces is used in regular fertilizer mixes and is reported to be especially suitable for use in several processes for production of granular and liquid fertilizers now being developed.

It is expected that under this expansion program the additional production will be available for the 1956-1957 sales year which begins June 1, 1956.

The United States Potash Company has also announced that it has secured the reservation of a large tract of Crown lands in the Province of Saskatchewan, Canada for the purpose of exploring for potash. A limited core-drilling program has been approved. The venture is regarded at this time as wholly exploratory.

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